Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations
"Research & Training to Improve Clinical Care"

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A Randomized Controlled Trial of King County Care Partners' Rethinking Care Intervention: Health and Social Outcomes up to Two Years Post-Randomization

Technical Report

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EXECUTIVE SUMMARY

Introduction

Rethinking Care (RTC) is a four-state demonstration program developed by the Center for Healthcare Strategies (CHCS), a nonprofit health policy resource center dedicated to improving health care quality for Medicaid beneficiaries with complex and high-cost health care needs. In Washington State, an RTC intervention was developed by the state Medicaid agency (Medicaid Purchasing Administration, now the Health Care Authority). It is an enhancement of an earlier pilot program known as King County Care Partners (KCCP).

The Washington State Rethinking Care intervention is a community-based, registered nurse (RN)-led, multidisciplinary care management designed to empower clients to address health care needs and enhance coordination, communication, and integration of medical and social services across safety-net providers.[1] In Washington State, RTC was funded by the Medicaid Purchasing Administration (MPA) in Department of Social and Health Services (DSHS).[2] The evaluation of the Washington State RTC was funded by the Center for Health Care Strategies to the state Medicaid agency.

The RTC intervention focused on the subset of Aged, Blind, and Disabled Medicaid clients with evidence of mental illness and/or chemical dependency, identified as being at risk of having future high medical expenses. To encourage participation in the RTC intervention, a variety of techniques were employed, including client outreach efforts by a skilled survey research team.[3] RTC participants received up to two years of intensive care management from a clinical team of RNs and social workers. Care management included an in-person comprehensive assessment of medical and social needs; collaborative setting of health-related goals; chronic disease self-management coaching; physician visits of clients accompanied by their care managers; frequent in-person and phone monitoring by care managers; connection to community resources; and coordination of care across the medical and mental health system. Details of these key elements of the RTC intervention are published elsewhere[4]

The evaluation of the RTC intervention had three components. First, an intent-to-treat (ITT) analysis focused on the policy question of the extent to which the intervention impacted the entire population to whom it was offered, with a special interest on cost savings. The ITT analysis included all clients who were randomized to the intervention, regardless of whether they actually participated. Second, the so-called care plan date analysis was designed to examine the intervention's impact for clients who actually participated in the intervention. The third component consisted of subgroup analyses to assess whether the intervention worked better for some clients than others. The three evaluation components are summarized in **Figure 1**.

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[1] For a description of a typical client served by RTC, see: Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (pp. 349-359). New York: John Wiley & Sons, Inc.

[2] The Medicaid Purchasing Administration is now part of the Washington State Health Care Authority.

[3] Court, B. (2010) *Enhanced Client Engagement Project Report* (Reference No. 100568), Washington State Medicaid Purchasing Administration, Office of Quality and Care Management.

[4] Lessler, D. S., Krupski, A., & Cristofalo, M. (2011). King County Care Partners: A community-based chronic care management system for Medicaid clients with co-occurring medical, mental and substance abuse disorders. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (pp. 339-348). New York: John Wiley & Sons, Inc.

Figure 1. Evaluation Design

Intent-to-Treat Analysis[5]

Evaluation Question:

From a policy perspective, what is the impact of the RTC intervention on the entire target population, particularly cost savings?

Comparison:

All clients randomized to the RTC Group (n=557) or Comparison Group (n=563) regardless of whether they participated in the intervention or not

Care Plan Date Analysis[6]

Evaluation Question:

What is the impact of the intervention on clients who actually participated in the intervention?

Comparison:

Clients who participated in the intervention (n=251)
versus a propensity score-matched comparison group (n=251)

Subgroup Analysis of Care Plan Date Analysis Sample[6]

Evaluation Question:

Among clients who participated in the intervention, are there subgroups that appear to benefit more (or less) from it?

Comparison:

(a) Clients **with need for alcohol or drug (AOD) treatment** who participated in the intervention (n=107)
versus clients with AOD treatment need in the original propensity-matched comparison group (n=110)
and
(b) Clients **without AOD treatment need** who participated in the intervention (n=144)
versus clients without AOD treatment need in the original propensity-matched comparison group (n=141)

The evaluation used five types of outcome measures:

1) Medical costs and service use—including total medical expenditures , emergency room, inpatient medical, outpatient medical, prescription drugs generally and narcotics specifically;
2) Long-term care services—including in-home and out-of-home services;
3) Chemical dependency treatment services;
4) Mental health care services—including outpatient mental health visits, state and community inpatient psychiatric costs, and admissions; and
5) Other outcomes—including criminal arrests and charges, homelessness, and death.

All data came from the state DSHS Research and Data Analysis (RDA) Client Outcomes Database (CODB).[7]

[5] A randomized controlled design
[6] A quasi-experimental design
[7] Kohlenberg, L. (2009). *Integrated client database. Data that improves DSHS decision making and services* (Report No. 11.144). Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.

Results

Intent-to-Treat Analysis

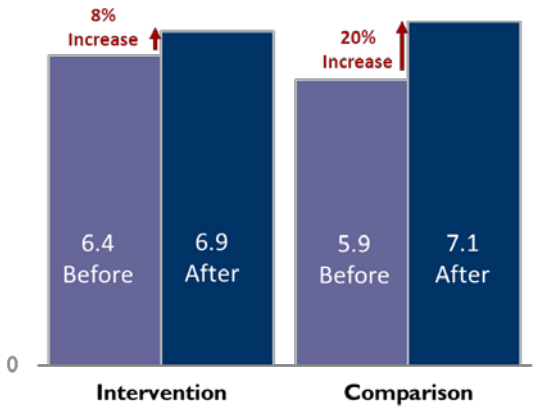
The intent-to-treat analysis was designed to address the policy question of RTC Program impact on the entire target population, particularly cost savings. Findings from this analysis did not provide evidence for significant savings in overall Medicaid medical, emergency room, or inpatient medical costs among clients offered the intervention. In fact, the RTC group incurred slightly higher costs for some health services than did the comparison group. This lack of evidence for cost savings may be due, at least in part, to the fact that only 45% of clients engaged in services offered. Another contributing factor is that the average client in the RTC sample had only one year of follow-up. Given the medical complexity of individuals in this study, it is likely that outcomes we examined here would take longer than one year to emerge.[8] As such, it would be important to continue to follow these clients for two, three, and ideally, four years following randomization if the Centers for Medicare & Medicaid Services restriction of randomized pilots lasting only one year could be lifted.

Care Plan Date Analysis

As with the intent-to-treat analysis, the care plan date analysis, designed to assess the impact of the intervention on clients who actually participated in the program, did not show overall net Medicaid savings. Nonetheless, it produced findings suggesting the intervention had a significant impact in a number of areas including increases in outpatient medical costs, prescription costs, long-term care costs and utilization (especially in-home support services), mental health service use, chemical dependency treatment use, and decreases in homelessness. Taken together, these findings suggest clients in the intervention group may have experienced increased access to care or more intense use of services relative to clients in the comparison group. In turn, these care patterns may have been related to findings of reduced inpatient medical costs, relatively fewer medical inpatient admissions, and fewer deaths in the intervention group. Each of these findings is discussed in more detail below.

Inpatient Medical Admissions and Costs. Among clients who participated in the intervention, there was evidence for impacts on inpatient medical admissions. That is, although average inpatient medical admissions increased in both the intervention and comparison groups between the pre- and post- periods, they increased to a lesser extent in the intervention group (8% increase) relative to the comparison group (20% increase) (See **Figure 2**).

Figure 2. Average Inpatient Medical Admissions Per 100 Members per Month (Care Plan)(p=0.09)



[8] Unützer, J., Katon, W. J., Fan, M., Schoenbaum, M. C., Lin, E. H. B., Penna, R. D. D., et al. (2008). Long-term cost effects of collaborative care for late-life depression. *The American Journal of Managed Care*, 14(2), 95-100.

This finding is likely driven by relatively fewer inpatient medical admissions preceded by an ER visit among clients who received the intervention (4% increase versus 31% increase in the comparison group) (See **Figure 3**). Between baseline and follow-up, the intervention group showed a 2% *decrease* in average PMPM cost for inpatient medical admissions preceded by an ER visit while the comparison group showed a 49% *increase* (See **Figure 4**).

Figure 3. Inpatient Medical Admissions with ER Visit (Care Plan)(p=0.02)
Mean Admissions Per 100 MPM

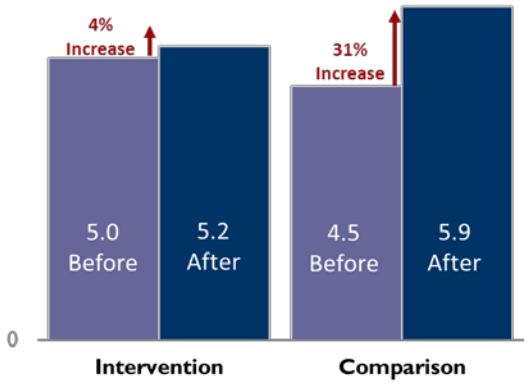
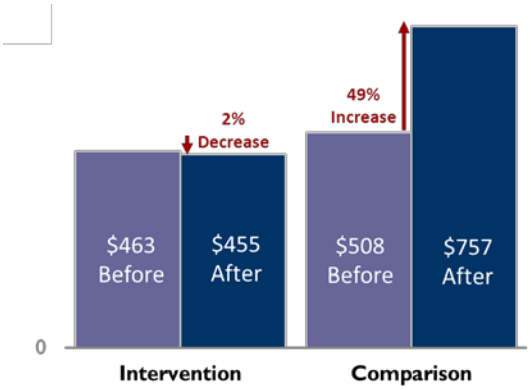
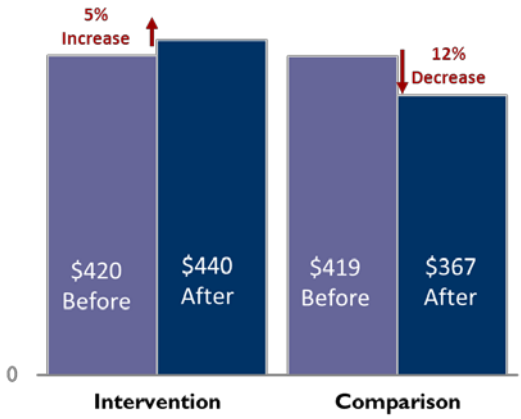


Figure 4. Inpatient Medical Admissions with ER Visit (Care Plan)(p=0.02)
Mean PMPM Cost



Outpatient Medical. Between the pre- and post-periods, average PMPM outpatient medical costs increased among intervention clients (5% *increase*) and declined among those in the comparison group (12% *decrease*) (See **Figure 5**). Although a modest increase, this is in the expected direction.

Figure 5. Outpatient Medical
(Care Plan)(p=0.10) Average Cost PMPM



Prescription Drug Costs. Clients in the intervention group also had higher prescription costs: There was a 21% *increase* in average prescription drug PMPM costs between baseline and follow-up relative to a 9% *decrease* among clients in the comparison group (See **Figure 6**). This increase may be due to a higher proportion of intervention clients accruing costs for narcotics prescriptions between baseline and follow-up relative to comparison clients—5% *increase* for intervention clients versus a 5% *decrease* for comparison clients (See **Figure 7**).

Figure 6. Prescription Drugs (Care Plan)(p=0.04)
Average Cost PMPM

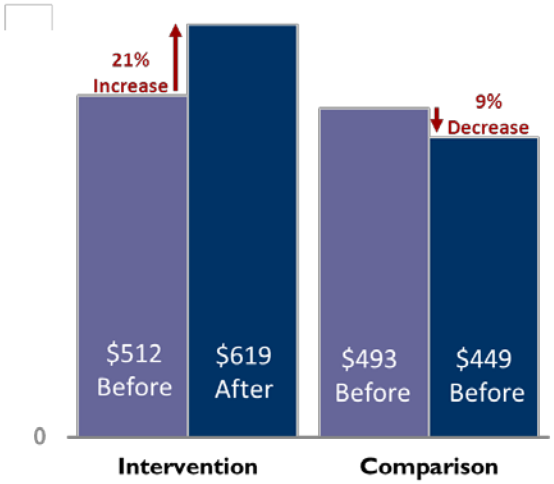
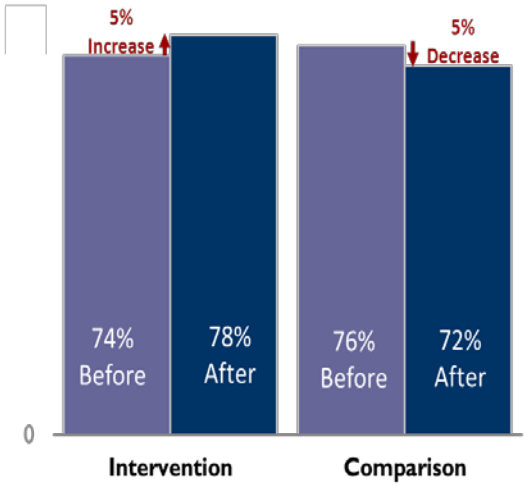


Figure 7. Narcotics (Care Plan)(p=0.09)
% Clients with Any Cost



The relatively high use of narcotic medication may be related to high levels of chronic pain reported by these clients. For example, baseline data indicated that 81% of assessed clients reported that they experienced pain of moderate-to-severe intensity in the previous three months. In a telephone survey administered about one year after randomization, 87% of clients reported being in moderate or extreme pain[9] when asked about pain as part of the EQ-5D.[10]

[9] Krupski, T., Cristofalo, M., Jenkins, L., Atkins, D., Joesch, J.M., West, I. I., & Roy-Burn, P. (2010, June). *Client Perspectives on the Rethinking Care Program: Report of a Telephone Survey.* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

[10] EuroQol Group (2012, March). EQ-5D™. Retrieved March 12. 2012, from http://www.euroqol.org

Chemical Dependency Treatment. Over 44% of randomized clients had a documented need for alcohol/drug treatment. As such, connecting them with chemical dependency treatment was an important part of the intervention. Analyses of chemical dependency treatment costs suggest the intervention was effective in making this connection. The average PMPM chemical dependency treatment cost *increased* by 10% for intervention clients between baseline and follow-up whereas it *decreased* by 28% for comparison clients during this same period (See **Figure 8**). The intervention may have been particularly helpful in increasing access to opiate substitution treatment (OST). A relatively larger proportion of intervention clients participated in OST between baseline and follow-up (10% *increase*) relative to comparison group clients (10% *decrease*) (See **Figure 9**). This trend is reflected in complementary increasing PMPM treatment costs in the intervention group (18% *increase*) relative to the comparison group (10% *decrease*) (See **Figure 10**).

Figure 8. Chemical Dependency Treatment (Care Plan) (p=0.03) Total Average PMPM Treatment Cost

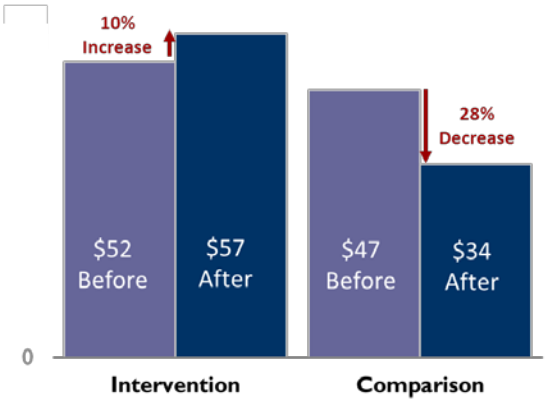


Figure 9. Chemical Dependency Treatment (Care Plan)(p=0.09) % Clients with Any Opiate Substitution Costs

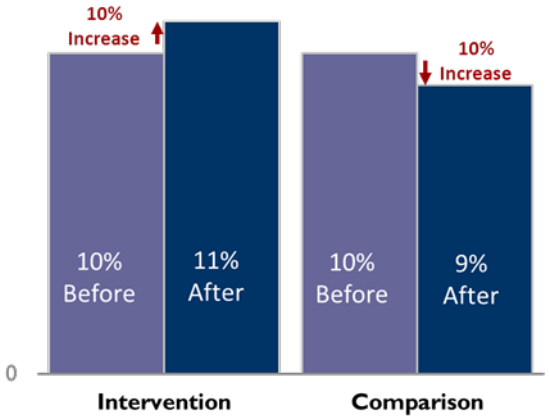
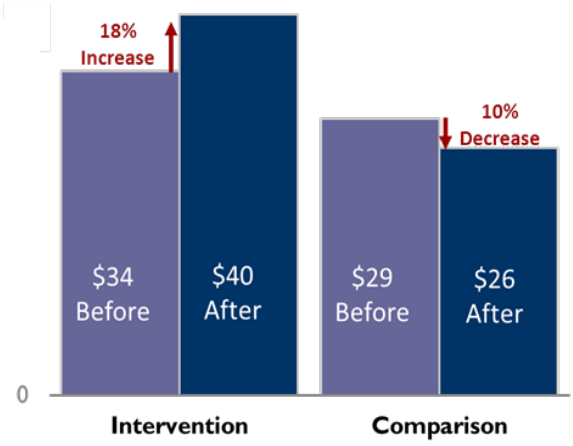
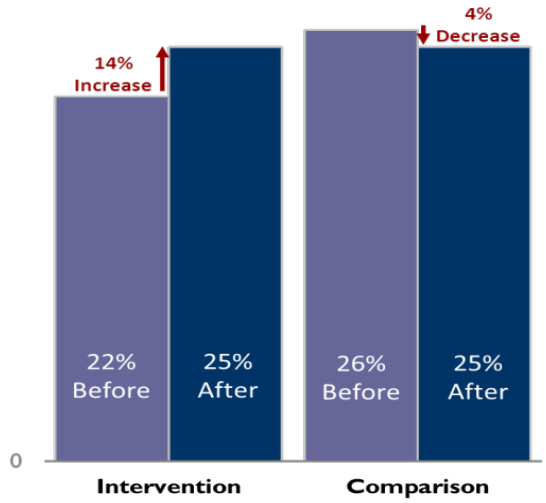


Figure 10. Chemical Dependency Treatment (Care Plan)(p=0.06) Average PMPM Opiate Substitution Treatment Cost



Mental Health Treatment. Approximately half the clients in this population had serious mental illness. Thus, connecting them with mental health services was an important part of the intervention. The findings suggest that the intervention was, in fact, successful in making the connection with outpatient mental health care. Following the intervention, there was an increase in the proportion of intervention clients receiving outpatient mental health care (14% *increase*) compared to a decrease among comparison clients (4% *decrease*) (See **Figure 11**).

Figure 11. Outpatient Mental Health Care (Care Plan)(p=0.08) % Clients with Any Visit



Long-Term Care Services. The intervention also appeared effective in connecting clients with long-term care services. In particular, following the intervention, there was a 22% increase in the proportion of clients who had any long-term care costs in the intervention group relative to an 11% increase in the comparison group (See **Figure 12**). Consistent with an increase in any cost were higher average costs for long-term care services, specifically a 19% increase among intervention clients versus a 6% increase among comparison clients (See **Figure 13**).

Figure 12. Long-Term Care (Care Plan)(p=0.04) % Clients with Any Cost

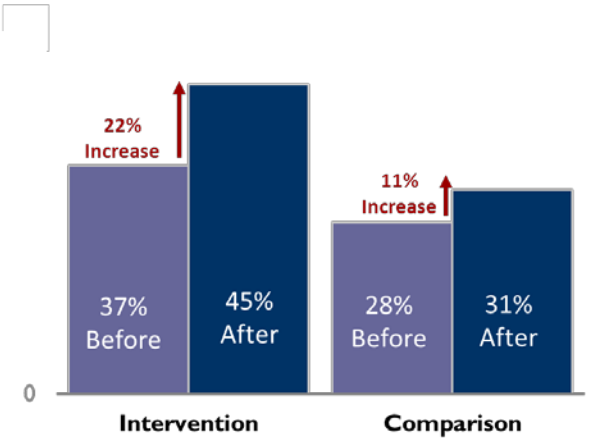
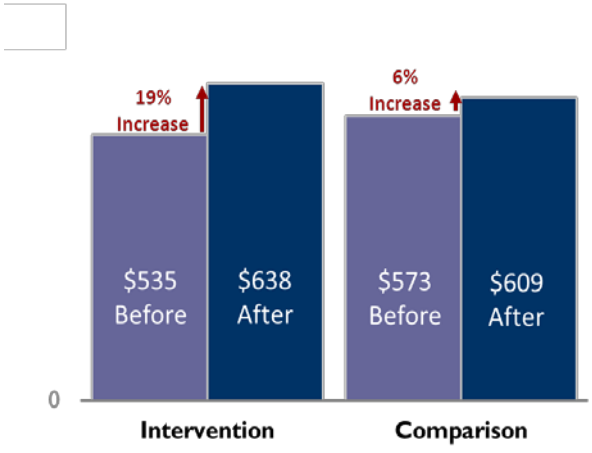
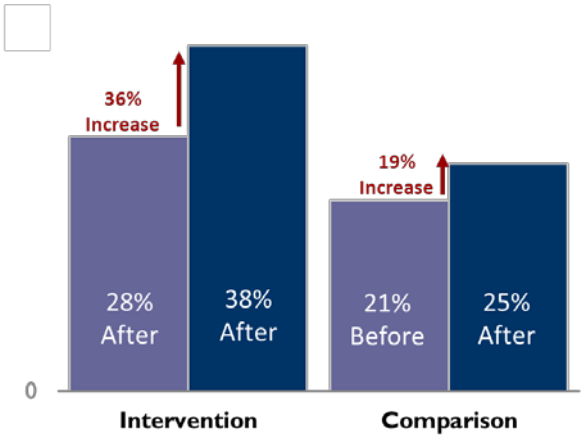


Figure 13. Long-Term Care (Care Plan)(p=0.09) Average Costs PMPM



These increases in long-term care services are due, at least in part, to significant increases in the cost of any in-home support services among intervention clients (36% increase) relative to comparison clients (19% increase) (See **Figure 14**).

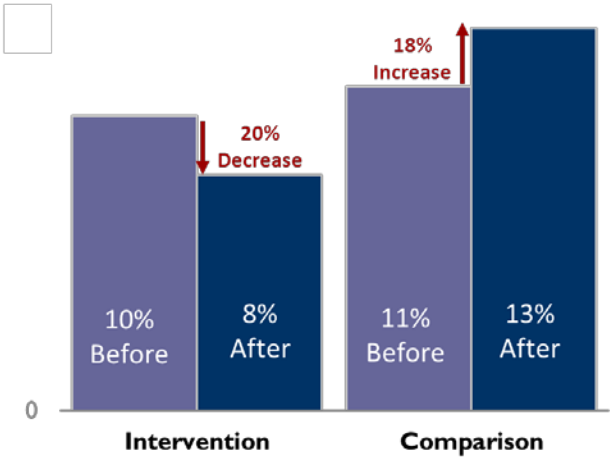
Figure 14. In-Home Support Services (Care Plan)(p=0.03)
% Clients with Any Cost



Because long-term care services are administered by the same agency that housed the RTC intervention team, it may not be surprising that intervention clients received significant increases in these services.

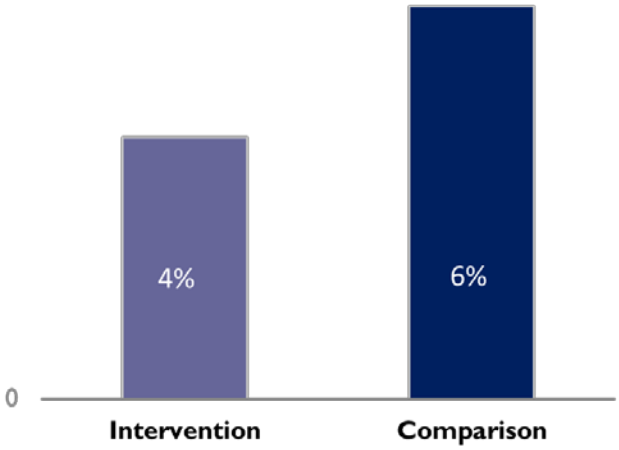
Homelessness. The intervention also appeared to be effective in preventing homelessness. In the intervention group, there was a 20% *reduction* in the percent of clients who experienced at least one month of homelessness following the intervention compared to an 18% *increase* in the comparison group (See **Figure 15**).

Figure 15. % Clients with One or More Months of Homelessness (Care Plan)(p=0.01)



Death. Analyses revealed a trend for relatively fewer deaths in the post-period among clients in the intervention group relative to clients in the comparison group (See **Figure 16**). It is possible that fewer deaths in the intervention group may have been a result of these clients receiving better access to care.

Figure 16. Death in The Post-Period (Care Plan)(p=0.06)



Subgroup Analyses

We conducted a subgroup analysis to determine whether some clients appeared to benefit more from the RTC intervention than others. This subgroup analysis was motivated by a cluster analysis, which suggested that two distinct groups of clients participated in the RTC intervention.

- Cluster #1: More likely male, younger, significant alcohol/drug use, trauma history including emotional and sexual abuse, isolated living situation, and significant mental health problems including psychotic disorder, depression, PTSD, and anxiety.
- Cluster #2: More likely female, older, living with close relatives, overweight, and likely to report problems with activities of daily living.

Effect Modification Analysis. The salience of drug and/or alcohol problems that emerged in the cluster analysis informed our subgroup analysis. This analysis compared outcomes for clients **with** a need for alcohol/drug treatment at baseline to clients **without** such a need. We refer to this subgroup analysis as the 'effect modification analysis'.

The effect modification analysis suggests that, among clients who participated in RTC, the intervention may have been particularly effective for clients with a documented need for AOD treatment at baseline. For example, the intervention appears to have bent the cost curve for total Medicaid medical costs, but only among clients with AOD treatment need (p=0.04). This finding may be due, in part, to cost savings through prevention of inpatient admissions (p=0.02) and relatively lower average costs for these admissions (p=0.01), especially for unplanned admissions with concurrent emergency room visits (p=0.01). In addition to medical cost savings, the RTC intervention provides other important values for clients with AOD treatment need, including lower odds of experiencing homelessness. The results for clients with AOD treatment need may have been observed because these clients were more likely to

participate in chemical dependency treatment (p=0.02), especially inpatient treatment (p=0.04), after they began the RTC intervention.

Conclusions

In summary, the evaluation of Washington State Rethinking Care Intervention finds few cost savings in the target population likely due to fairly low rates of program participation and the short follow-up period. However, other benefits were apparent, including improved access to health care and AOD treatment and lower odds of death. Results of the analysis restricted to those who participated in the program suggest that intensive care management may increase access to needed care, slow growth in cost and numbers of hospitalizations, and prevent homelessness and death. Such benefits may accrue, in particular, to clients with documented need for alcohol or drug treatment, possibly because the intervention resulted in their receiving chemical dependency treatment. These findings may be applicable to clients who engage in other start-up, care management programs targeted to hard-to-reach populations—and in particular, to high-cost, high-risk Categorically Needy Aged, Blind, and Disabled Medicaid clients with a high prevalence of addiction, serious mental illness, and other chronic conditions.

Recommendations

- Offer intensive care management services to high-risk, high cost Medicaid clients. Findings from this evaluation suggest potential cost savings in expensive inpatient care as well as other benefits such as reduction in homelessness and death among those who engage in such interventions-- in particular, among individuals with drug and alcohol treatment need.

- Future evaluations are recommended over longer time horizons. Given the complex chronic health conditions in the study population, it is likely that it takes longer than two years to see the full effects of care management interventions.

- Qualitative and quantitative studies should be designed to understand why some individuals do not engage in care management when offered. Intensive outreach efforts demonstrated in the current study were successful. Even still, half of those offered the intervention did not participate, while the evaluation indicates benefits among those who did participate.

- In future studies, request that CMS make exceptions to restricting randomized designs to one year in order to allow longer follow-up of clients.

INTRODUCTION

Background

Rethinking Care (RTC) is a four-state demonstration program developed by the Center for Healthcare Strategies (CHCS), a nonprofit health policy resource center dedicated to improving health care quality for Medicaid beneficiaries with complex and high-cost health care needs. RTC focuses on designing and testing new interventions for the five to twenty percent of Medicaid beneficiaries whose care needs account for a significant portion of state Medicaid expenditures. RTC has four overarching goals: 1) to identify patients most likely to benefit from enhanced care management; 2) to develop tailored care management interventions; 3) to implement interventions; and 4) to rigorously measure quality and cost outcomes of the interventions. The RTC initiative began in 2008 with support from multiple funding sources.[11]

In Washington State, the RTC pilot was developed by the state Medicaid agency (Medicaid Purchasing Administration, now the Health Care Authority)[12] and was carried out in collaboration with CHCS. The pilot is an enhancement of the earlier pilot program King County Care Partners (KCCP). KCCP was initiated in early 2007 to provide chronic care management for Medicaid fee-for-service (FFS) adult Aged, Blind, and Disabled Medicaid patients who were identified as being in the top 20% of clients at risk of having future high medical expenses in King County, Washington. The KCCP Program was a collaboration between City of Seattle Aging and Disability Services (ADS), Senior Services of King County, Harborview Medical Center (HMC), and four community health centers. It offered care management, health education and assistance, and coordination of medical services to eligible patients with the intent of improving quality of medical care and reducing medical costs.[13] An evaluation of the 2007 KCCP pilot program indicated that, of the 839 individuals offered the program, only 18% (or 153 individuals) agreed to participate. Preliminary results indicated no medical cost savings. However, the death rate was significantly lower for the intervention group relative to the comparison group.[14]

In February 2009, the RTC enhancement of the KCCP Program was launched in collaboration with KCCP staff. The focus was on the subset of Aged, Blind, and Disabled Medicaid clients at risk of future health care costs 50% or higher than average who also had evidence of mental illness and/or chemical dependency. All clients were Supplemental Security Income (SSI) recipients. The RTC intervention consists of community-based, registered nurse (RN)-led, multidisciplinary care management designed to empower clients to address health care needs, and enhance coordination, communication, and integration of services across safety-net providers.[15] At-risk clients could receive up to two years of intensive care management from a clinical team of RNs and social workers. Care management included an in-person comprehensive assessment; collaborative goal setting; chronic disease self-management coaching; physician visits where clients were accompanied by their care managers; frequent in-person

[11] For more information and resources produced through the RTC initiative, visit http:/www.chcs.org.
[12] In 2011, the Washington State Health and Recovery Services Administration (HRSA) became part of the Washington State Health Care Authority (HCA).
[13] Qualis Health (2008, December). *Evaluation of Washington State Medicaid Chronic Care Management Projects. Qualitative Report*. Seattle, WA: Author
[14] Court, B. & Mancuso, D. (2008, October). *King County Care Partners Chronic Care Management Project. Savings/Cost Analysis*. Olympia, WA: Health and Recovery Services Administration, Washington State Department of Social and Health Services.
[15] For a description of a typical client served by RTC, see: Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients . In Schraeder, C. (Ed), *Medicaid Care Management Best Practices (pp.349-359).* New York: John Wiley & Sons, Inc.

and phone monitoring; connection to community resources; and coordination of care across the medical and mental health system.[16]

To encourage participation in the RTC intervention, a variety of techniques were employed including client outreach efforts by a skilled survey research team.[17] The key elements of the RTC intervention are published in detail elsewhere.[18] Briefly, after clients agreed to enroll, they were referred to a nurse-care manager for an initial in-person meeting and comprehensive assessment. This assessment took approximately 60-90 minutes and included administration of validated instruments to screen for common mental illness, substance abuse, and health literacy; assessment of chronic medical conditions, chronic pain, and functional status; review of medications; identification of psychosocial issues that may impact a client's ability to access health care or follow through on care plans; and collaborative goal-setting that focused on and took account of the client's expressed needs, both medical and psychosocial. Subsequent contacts, either in-person or by telephone, with a nurse or social worker included: goal setting; coaching (e.g., strategies to improve the quality of physician-client communication); self-advocacy; self-management of health; health system access and navigation; modeling (in joint visits to one or more physician appointments); ongoing social support; health care coordination; referral to primary, specialty, and mental health care; and referral to and connection with community resources.

Staff carrying out the intervention had access to comprehensive client health and demographic information extracted from a variety of administrative data sources. For example, staff could review an individual client's recent use of medical services including inpatient hospital and emergency department visits, diagnoses, and filled prescriptions in an easily navigated and clinically meaningful display. This tool served as a rich source of clinically-relevant data to inform care management interventions.[19]

The RTC evaluation was designed as a randomized controlled trial to allow for a rigorous assessment of its impact. In 2009, 690 clients were randomized to the treatment group and 689 were randomized to a "wait list" group who became eligible for the intervention at a later date. The Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP) at the University of Washington at Harborview Medical Center was commissioned by Department of Social and Health Services (DSHS) to carry out a quantitative evaluation of the RTC intervention. The remainder of this report provides results from the Washington State RTC Program evaluation including outcomes up to twenty-four months post-randomization.

[16] Lessler, D. S., Krupski, A., Cristofalo, M. (2011). King County Care Partners: A community-based chronic care management system for Medicaid clients with co-occurring medical, mental and substance abuse disorders. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices (pp. 349-359)*. New York: John Wiley & Sons, Inc.

[17] Court, B. (2010, July) *Enhanced Client Engagement Project Report* (Reference No. 100568). Olympia, WA: Washington State Medicaid Purchasing Administration, Office of Quality and Care Management.

[18] Lessler, D. S., Krupski, A., Cristofalo, M. (2011). King County Care Partners: A community-based chronic care management system for Medicaid clients with co-occurring medical, mental and substance abuse disorders. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices (pp. 339-348)*. New York: John Wiley & Sons, Inc.

[19] Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (349-359). New York: John Wiley & Sons, Inc.

Specific Aims & Research Questions

This quantitative evaluation aims to assess the impact of offering an intensive care management program (RTC) to high-risk Medicaid clients on the following outcomes measured up to 24 months post-randomization:

a) Medical service use and costs (i.e., total medical, emergency room, inpatient, outpatient, and prescription drugs);
b) Long-term care (in-home and residential long-term care services) use and costs;
c) Chemical dependency treatment use and costs;
d) Mental health service use and costs (i.e., outpatient, state and community inpatient);
e) Other outcomes (i.e., criminal arrests and charges, homelessness, and death).

The evaluation was designed to answer the following seven questions.

Section I: Intent-to-Treat Analysis

1) From a policy perspective, were there cost savings associated with providing the RTC intervention to the target population?
2) What was the return on investment?
3) Aside from costs, were there other beneficial outcomes or "value added" by providing the RTC intervention to the target population?

Section II: Program Participation Analysis

4) What were the characteristics of the individuals who participated in the program and how did they differ from those who did not?

Section III: Care Plan Date Analysis

5) Were there cost savings among those individuals who engaged in the program?
6) Were there other beneficial outcomes or "value added" among those individuals who participated in the program?

Section IV: Subgroup Analyses

7) Were there specific subgroups within the program participants who benefited more (or less) from the intervention?

In what follows, the design and statistical methods are described and results presented. In the Discussion section, beginning on page 44, the results are synthesized to answer the seven questions.

Sample

To be eligible to participate in the RTC program, a client had to meet the following criteria **(Appendix A)**:

- Enrollment in the SSI Medicaid Categorically Needy program
- King County residence
- At least one encounter with KCCP
- At least one chronic physical condition and evidence of mental health problems, substance abuse, or both

- Predicted future health care costs at least 50% higher than those of the average Medicaid SSI client (risk score of 1.5 or higher).[20]

Of the 690 individuals randomly selected to be eligible for the RTC intervention, 133 (19%) were excluded from the evaluation because they lost Medicaid coverage, moved, became dual eligible (i.e., were enrolled in Medicaid and Medicare), or died before the date of randomization or "index date". Similarly, 123 (18%) were excluded from the comparison group. Thus, the evaluation is based on data from 557 RTC clients and 563 comparison clients. Those excluded from the analysis were approximately 4 years older than those who remained eligible for the program ($p<0.01$), but did not differ by sex or racial/ethnic minority group membership.

Data Source

All data for this evaluation were derived from the state DSHS Research and Data Analysis (RDA) Client Outcomes Database (CODB).[21] The CODB includes Medicaid medical utilization and cost data from the Medicaid Management Information System (MMIS)/Provider One (P1) from the Health Care Authority (HCA); chemical dependency treatment records from the Treatment and Assessment Report Generating Tool (TARGET) from the state Division of Behavioral Health and Recovery (DBHR); outpatient mental health service utilization and inpatient psychiatric service utilization records from the state DBHR and HCA; arrest records from the Washington State Patrol (WSP); death records from the state Department of Health (DOH); and long-term care service utilization and costs from the state Aging and Disability Services Administration (ADSA).

Outcome Measures

This report focuses on outcomes in five categories:

1) Medical costs and service use (i.e., total medical expenditures , emergency room, inpatient medical, outpatient medical, prescription drugs generally and narcotics specifically);
2) Long-term care services—including in-home and out-of-home services;
3) Chemical dependency treatment services;
4) Mental health care services (i.e., outpatient mental health visits, state and community inpatient psychiatric costs and admissions); and
5) Other outcomes (i.e., criminal arrests and charges, homelessness, death).

All outcome measures were available up to 24 months in the post-period. Because time in the RTC or comparison group varies by individual in the post-period (e.g., due to loss of Medicaid eligibility or death), continuous measures are expressed as per member per month (PMPM) for costs and utilization.

[20] A risk score of 1.5 is interpreted as the client having predicted future health care costs 50% higher than those of the average Medicaid SSI client. See also: Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (pp.349-359). New York: John Wiley & Sons, Inc. and Gilmer, T., Kronick, R., Fishman, P., Ganiats, T. G. (2001). The Medicaid Rx Model. Pharmacy-based risk adjustment for public programs. *Medical Care*, 39 (11), 1188-1202.

[21] Kohlenberg, L. (2009). *Integrated client database. Data that improves DSHS decision making and services* (Report No. 11.144) Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.

SECTION I: INTENT-TO-TREAT ANALYSIS

The intent-to-treat analysis is designed to address the policy question of whether the RTC intervention had an impact on the entire population to which it was offered. As such, all clients were included in this analysis whether they participated in the intervention or not. The specific questions we intended to answer through this analysis are:

1) **From a policy perspective, were there cost savings associated with providing the RTC intervention to the target population?**
2) **What was the return on investment?**
3) **Aside from costs, were there other beneficial outcomes or "value added" from providing the RTC intervention to the target population?**

Results informing answers to these questions are presented in this section. The full answers are presented in the Discussion section.

Design

The intent-to-treat (ITT) analysis compares outcomes in the pre- and post-intervention periods from individuals randomized to receive the RTC intervention (RTC group; n = 557) to those in the wait list group (hereafter comparison group; n = 563) in a randomized controlled design. An intent-to-treat (ITT) analytic approach uses data from all clients in the RTC group, regardless of whether the client actually participated in the intervention. An ITT analysis is the best approach if one is interested in measuring the impact of offering a program to the entire target population. Subsequent analyses (see II. Care Plan Date Analysis) begin to address the question of program impact on the subset of clients who actually received the intervention.

RTC clients included in the evaluation were randomized to the RTC intervention in February or March 2009. The date of randomization, or "index date", was used to define the pre-period and post-periods. A maximum of 12 months of data were available for the pre-period and a maximum of 24 months for the post-period, which started with the index month. No data were used for months when clients were either ineligible for the program due to loss of Medicaid eligibility, dual Medicaid/Medicare status, or had died.

Statistical Analysis

Test statistics (chi-square and t-tests) were used to assess whether the RTC and comparison groups differed during the pre-period and to summarize unadjusted differences between the RTC and comparison groups in the post-period. To assess the impact of offering a chronic care management program on health care cost, utilization, and other outcomes, we used a difference-in-differences (D-I-D) approach including Time (Post-period=1, Pre-period=0), Group (RTC = 1, Comparison =0) and the interaction of Time by Group in the statistical models. The coefficient estimate for the interaction term of Time by Group Assignment represents the D-I-D estimate (i.e., the estimate of differences in the outcome measure). The D-I-D approach takes into account changes in outcome measures that may occur irrespective of the intervention itself, assuming those changes impact the intervention and control groups in the same way.

D-I-D models for continuous outcome measures were estimated with ordinary least squares multivariable regression using data from all individuals, including those incurring zero costs or visits. D-I-

D models for binary outcome measures, such as incurring any expenditure or receiving any service or treatment (yes=1, no=0), were estimated with logistic multivariable regression. All multivariable models controlled for characteristics that may confound associations between the RTC intervention and outcomes including age (in years), race/ethnicity, sex, a baseline risk score measure of physical and mental health, an indicator of serious mental illness, and an indicator of need for alcohol and drug treatment. Two observations were used per individual: one for the pre-period and one for the post-period. Robust standard errors were estimated to account for the resulting non-independence of observations. All regression models were weighted by the number of months in the post-period for which data were available for an individual. Statistical significance was set at $p \leq 0.05$; findings with p-values ranging from $p > 0.05$ to $p \leq 0.10$ were highlighted as close to significant.

All D-I-D estimates are interpreted as the difference in outcome in the post-period for the treatment group relative to the comparison group, taking into account group differences in outcomes in the pre-period.

Results

Sample Characteristics

As expected with randomization, the RTC and comparison groups were similar at baseline with respect to sex, age, racial/ethnic composition, and medical risk (**Table I-1**). On average, clients were 51 years old. Nearly half of the clients were male; 57% were white, non-Hispanic. Approximately half of the clients in each group had a serious mental illness. In addition, the percent of clients with alcohol or drug (AOD) treatment need or who engaged in specific AOD treatment services in the pre-period was similar in both groups. The two groups were also similar in the length of time they were eligible for Medicaid in the pre-and post-periods. Thus, the amount of available follow-up data was the same for both groups.

During the pre-period, the two groups did not differ significantly on most outcome measures, suggesting a closely matched comparison group **(Appendix B)**. However, some outcome measures either reached statistical significance ($p \leq 0.05$) or were close to significantly different ($p > 0.05$ and $p \leq 0.10$). Specifically, during the pre-period relative to the comparison group, the RTC group had: a) Lower average PMPM inpatient costs (without emergency visit) ($195 versus $290; p=0.10); b) Higher percent incurring any long-term care costs (32% versus 27%; p = 0.04); c) Higher percent incurring any out-of-home long-term care costs (13% versus 9%; p = 0.04); d) Higher percent incurring any adult family home services (6% versus 2%; p<0.01); e) Higher average PMPM adult family home costs ($77 versus $36; p = 0.03); f) Higher average PMPM prescription drug costs ($492 versus $438; p=0.09); g) Lower percent incurring any outpatient mental health visits (23% versus 32%; p<0.01); and h) Lower percent with any criminal conviction (8% versus 11%; p = 0.09).

Table I-1: Selected Pre- and Post-Period Measures for RTC and Comparison Groups

	RTC Group n = 557	Comparison Group n = 563	
DEMOGRAPHICS	% or Mean (SD) Range	% or Mean (SD) Range	**p**
Mean Age in Years	50.5	51.0	0.42
(SD) Range	(10.7) 22-85	(9.9) 21-84	-----
% Male	48%	46.0%	0.68
% Race/Ethnicity			
White, Non-Hispanic	56%	57%	0.82
Black, Non-Hispanic	26%	27%	-----
Asian	6%	6%	-----
American Indian/Alaska Native	3%	3%	-----
Hispanic	7%	5%	-----
Other	2%	2%	-----
RISK PROFILE			
Mean Risk Score[a] (Jan 2009),	2.5	2.5	0.72
(SD) Range	(1.3) 1.5 - 15.8	(1.3) 1.5 - 16.1	-----
% Clients with Serious Mental Illness	49%	50%	0.77
MEDICAID ELIGIBILITY			
% Clients with < 12 Months in Pre-period	8%	9%	0.54
Mean Months Eligible in Pre-period, (SD) Range	12 (1) 5 - 12	12 (1) 5 - 12	0.89
Mean Months Eligible in Post-period, (SD) Range	20 (7) 1 - 24	20 (7) 1 - 24	0.88
CHEMICAL DEPENDENCYTREATMENT – PRE-PERIOD ONLY			
% Clients with Treatment Need	44%	49%	0.15
% Clients with Any Treatment Engagement	20%	20%	0.83
Inpatient Treatment			
% Clients with Any Cost	4%	4%	0.91
Mean Cost PMPM (SD)	$8.23 ($55.63)	$18.5 ($138.35)	0.75
Median Cost PMPM,	$0	$0	-----
Range	$0-$628.94	$0-$1,937.24	-----
Outpatient Treatment			
% Clients with Any Cost	14%	14%	0.81
Mean Cost PMPM (SD)	$12.94 ($52.30)	$11.98 ($47.20)	0.75
Median Cost PMPM	$0	$0	-----
Range	$0-$633.45	$0-$647.72	-----
Opiate Substitution Treatment			
% Clients with Any Cost	10%	9%	0.81
Mean Cost PMPM (SD)	$32.74 ($110.47)	$32.45 ($105.21)	0.96
Median Cost PMPM	$0	$0	-----
Range	$0-$700.04	$0-$772.03	-----
Alcohol or Drug Case Management			
% Clients with Any Cost	9%	9%	0.87
Mean Cost PMPM (SD)	$0.63 ($2.73)	$0.59 ($4.48)	0.84
Median Cost PMPM	$0	$0	
Range	$0-$28.89	$0-$94.48	

[a]Study eligibility criteria required a DxRx score >1.5.

ITT Analysis: Medical Costs and Service Use

Most difference-in-differences estimates were not statistically significant for the outcomes examined: i.e., total Medicaid medical costs, emergency room costs and visits, outpatient medical costs and visits, inpatient medical costs and admissions (total and with a preceding emergency room visit) or long-term care costs (total, in-home services, out-of-home services). See Appendix B. A few statistically significant differences in outcomes did emerge (**Table I-2**).

- There was a decrease in the average number of inpatient admissions (without a preceding emergency room visit) among comparison group clients while there was an increase in the RTC group. On average, the RTC group had 0.50 more inpatient admissions (without an ED visit) per 100 members per month in the post-period ($p<0.09$).
- There was an increase in average prescription drug costs in the RTC group in contrast to a decrease in the comparison group, with the RTC group having average costs $74 higher than the comparison group in the post-period ($p=0.04$).
- There was a greater increase in the proportion of clients with narcotics costs in the RTC group relative to the comparison group, with the RTC group having 32% greater odds of incurring narcotics costs (OR=1.32; $p=0.09$) in the post-period.

Table I-2: ITT Results for Medical Costs and Service Use for Rethinking Care (RTC) and Comparison Group Members (Comparison)

Outcome Measure	Group RTC: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Medical Costs and Service Use						
Number of Inpatient Admissions (without Emergency Room Visit) per 100 Members Per Month	RTC Comparison	1.5 1.8	1.6 1.3	+0.01 -0.05	0.50	0.09#
PMPM Total Prescription Drug Costs	RTC Comparison	$492 $438	$525 $397	+$32 -$40	$74	0.04*
% of Clients with Any Narcotics Costs	RTC Comparison	69% 72%	76% 73%	+7% +1%	1.32	0.09#

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at $p<0.05$.
#Close to statistically significant ($p>0.05$ & ≤ 0.10).

ITT Analyses: Long-Term Care Costs and Service Use

There were no statistically significant differences between the groups in most long-term care cost and service use measures including in-home support services, out-of-home support services and total long-term care services. One exception that reached statistical significance was the proportion with any adult family home costs (**Table 1-3**):

- The proportion of clients who received adult family home services did not change in the RTC group, but increased in the comparison group with the RTC group 41% less likely to incur these costs in the post-period (p=0.02).

Table I-3: ITT Results for Long-Term Care Costs and Service Use for Rethinking Care (RTC) and Comparison Group Members (Comparison)

Outcome Measure	Group RTC: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Long-Term Care Costs and Service Use						
% of Clients with Any Adult Family Home Costs	RTC Comparison	6% 2%	6% 4%	0% +2%	0.59	0.02*

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & ≤=0.10).

ITT Analysis: Chemical Dependency Treatment

There were no statistically significant differences between the groups in most chemical dependency treatment outcomes (**Table I-4)** including total cost (i.e., sum of inpatient, outpatient, opiate substitution), inpatient, outpatient, opiate substitution and detox services. Two exceptions approached statistical significance (p<=0.10):

- Between the pre- and post-periods, average total PMPM treatment costs declined more in the comparison group than in the RTC group. Overall, the RTC group had $13 higher average PMPM treatment costs in the post-period (p= 0.10).
- Between the pre- and post-periods, average inpatient PMPM treatment costs did not change in the RTC group and decreased in the comparison group. In the post-period, the RTC group had $11 higher PMPM treatment costs (p= 0.07).

Table I-4: ITT Results for Alcohol and Drug Treatment for Rethinking Care Clients (RTC) and Comparison Group Members (Comparison).

Outcome Measure	Group RTC: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Alcohol and Drug Treatment						
Total PMPM Treatment Costs (Sum of Inpatient, Outpatient or Opiate Substitution)	RTC Comparison	$54 $63	$50 $46	-$4 -$17	$13	0.10[#]
Total PMPM Inpatient Treatment Costs	RTC Comparison	$8 $19	$8 $5	0 -$14	$11	0.07[#]

[a]The pre-period represents up to 12 eligible months before a client's index month.

[b]The post-period represents up to 24 eligible months following the index month.

[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).

[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.

[*]Statistically significant at p<0.05.

[#]Close to statistically significant (p>0.05 & ≤=0.10).

ITT Analysis: Mental Health Care

There were no statistically significant differences between the groups in most mental health care outcomes including community inpatient psychiatric costs and admissions, state hospital days and costs or total psychiatric inpatient costs.

One exception that reached statistical significance (**Table I-5**) was outpatient mental health visits:

- The percent of clients with any outpatient mental health visits increased in the RTC group but decreased slightly in the comparison group, resulting in 30% greater odds of mental health visits for the RTC group in the post-period (OR=1.30; p=0.02).

Table I-5: ITT Results for Mental Health Care for Rethinking Care Clients (RTC) and Comparison Group Members (Comparison).

Outcome Measure	Group RTC: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Mental Health Care						
% of Clients with Any Outpatient Mental Health Visits (from RSN Encounter Data)	RTC Comparison	23% 32%	26% 30%	+3% -2%	1.30	0.02*

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & ≤=0.10).

ITT Analysis: Other Outcomes

Most other outcomes did not differ significantly between the two groups including criminal arrests, charges, felony or gross misdemeanor charges, alcohol or drug arrests. The proportion of clients experiencing homelessness—defined as living in a shelter (battered spouse, emergency housing) or in an inappropriate living situation without housing (outdoors), or nominal rent and in-shelter expenses—also did not differ significantly between the groups.

There were three exceptions that reached statistical significance (**Table I-6**). The first two favored the comparison group:

- There was a decrease in the proportion of comparison group clients with any criminal conviction in contrast to no change in the RTC group, with 95% greater odds of conviction in the RTC group in the post-period (p=0.02).
- The number of criminal convictions declined in both groups, but the decline was greater in the comparison group. Overall, the RTC group had on average 8.9 more criminal convictions per 1,000 members per month than the comparison group in the post-period (p=0.09).
- The third exception favored the RTC group who had lower odds of death in the post-period than the comparison group (OR=0.68; p=0.10). There was no difference in the average time to death between the groups (RTC = 10.5 months, Comparison = 11.6 months; p=0.64).

Table I-6: ITT Results for Other Outcomes for Rethinking Care Clients (RTC) and Comparison Group Members (Comparison).

Outcome Measure	Group RTC: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Other Outcomes						
% of Clients with Any Criminal Conviction	RTC Comparison	8% 11%	8% 7%	0% -3%	1.95	0.02*
Number of Criminal Convictions per 1,000 Members Per Month	RTC Comparison	17 26	9 9	-8 -17	8.9	0.09#
% of Deaths in the Post-Period	RTC Comparison	----- -----	7 7.6	----- -----	0.68	0.10#

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & ≤=0.10).

ITT Analysis: Sensitivity Analyses

We conducted sensitivity analyses to assess whether the ITT findings were influenced by high end-of-life costs or service use among individuals who died in the post-period. First, we examined all study outcomes in a sample limited to deceased individuals and did not find significant differences between the RTC and comparison groups. Second, we re-estimated all D-I-D models after excluding deceased individuals from the sample. With one exception, we did not find substantive differences in our reported results either. The exception is the difference between the RTC and comparison groups in the odds of incurring narcotics prescription costs, which was no longer statistically significant (OR=1.24; p=0.20). We conclude that high end-of-life costs were unlikely an important reason for the reported ITT findings.

SECTION II: PROGRAM PARTICIPATION ANALYSIS

4) What were the characteristics of the individuals who participated in the program and how did they differ from those who did not?

Results informing an answer to this question are presented in this section. The full answer is presented in the Discussion section.

Of those offered the RTC intervention (n = 557), 51% completed a comprehensive in-person assessment of their health and social needs and 45% set at least one health-related care plan goal. **Table II-1** summarizes selected characteristics of clients who engaged in the RTC intervention to the point of setting at least one health related goal with a care manager relative to those who did not progress to this point. The care plan goal is an early program milestone and is used as a proxy for program engagement.

The two groups did not differ on age, race/ethnicity, risk score, pre-period Medicaid eligibility months, pre-period homeless months or post-period death. Consistent with the findings in our earlier report,[22] detailing the characteristics of RTC program participants versus non-participants, we find more program participants were female and more received Aging and Disability Services Administration (ADSA) in-home support services in the pre-period.

[22] West, I. I., Joesch, J. M., Atkins D., Krupski, T., Cristofalo, M., Jenkins, L., Roy-Byrne, P. (2010). *Clients Assigned to the Rethinking Care Program Intervention: How Do Clients Who Started an Assessment Differ from Those Who Did Not?* Seattle, Washington: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

Table II-1: Selected Characteristics of RTC Program Participants and Non-Participants

RTC SAMPLE CHARACTERISTICS

	Participants	Non-participants		
DEMOGRAPHICS	**n = 251**	**n = 306**	**p**	
Mean Age in Years	50.2	50.8	0.48	
(SD) Range	(9.5) 22-83	(11.7) 22-85	-----	
% Male	0.4%	0.5%	0.02%	
Race/Ethnicity				
% White, NH	50.6%	61.2%	0.22	
% Black, NH	30.8%	22.3%	-----	
% Other	18.6%	16.5%	-----	
RISK PROFILE				
Mean Risk Score (DxRx) Jan 2009	2.5	2.5	0.74	
(SD) Range	(1.4) 1.5 - 15.8	(1.3) 1.5 - 9.7	-----	
% Clients with Serious Mental Illness	49%	49.7%	0.87	
% Clients wih Alcohol or Drug Treatment Need (Pre-period)	42.5%	45.8%	0.44	
MEDICAID ELIGIBILITY				
% Clients with < 12 months in Pre-period	6.1%	8.7%	0.24	
Mean Pre-period Eligibility	12.0	12.0	0.79	
(SD) Range	(1) 5 - 12	(1) 5 - 12		
Mean Post-period Eligibility	22 (5) 2 - 24	18 (8) 1 - 24	<0.01	*
(SD) Range				
IN-HOME SERVICES				
% Clients Who Received Any in Pre-period	25.9%	18.7%	0.04	*
Mean Pre-period Cost PMPM	$346	$246	0.11	
(SD) Range	(760)$0 - $5,376	(697)$0 - $4,639		
OTHER				
Mean Months Homeless in Pre-period	1	1	0.13	
(SD) Range	(3) 0 - 12	(3) 0 - 12		
% Clients Who Died in Post-period	7%	8%	0.68	

*Statistically significant at p<.05.

For clients who completed the comprehensive assessment, the time from randomization to assessment ranged from 0 – 15 months (mean 6), suggesting considerable delays in program onset for many clients.

The number and type of contacts with the program were examined using data entered in the KCCP contacts database through December 31, 2010. Contacts were separated into two types:

1) **Client contacts,** defined as contacts between client and care manager that took place by telephone or in person either in the clinic or the client's home; and
2) **Collateral contacts**, defined as contacts completed in the course of the client's care that did not include direct contact with the client. Examples of collateral contacts are phone calls or in-person visits with the client's providers, referrals, or case review with other providers.

For clients who proceeded to the point of setting a health-related care plan goal, there were 19,789 total contacts. Of these, approximately 39% (n=7,698) were client contacts and 61% were collateral contacts (n=12,091).

Table II-2: Program Participation

Months from Randomization to Assessment	
Mean (SD)	6 (4)
Median (Range)	5 (0 – 15)
Months from Randomization to Care Plan Goal	
Mean (SD)	7 (4)
Median (Range)	7 (0 - 16)
Number of Client Contacts	
Mean (SD)	31 (28)
Median (Range)	23 (1 – 191)
Number of Collateral Contacts	
Mean (SD)	49 (33)
Median (Range)	42 (5 – 13)
Number Total Contacts (Client + Collateral)	
Mean (SD)	80 (59)
Median (Range)	64 (9 – 404)
Total Days Enrolled in RTC*	
Mean (SD)	362 (171)
Median (Range)	380 (6 – 1,039)

* Note: Days in program were extracted as of February 2012. This is a longer time period than data available for outcome evaluation.

Table II-3 summarizes results of the 5-item EQ-5D, a standardized instrument designed to describe health status based on clients' self-report. Between 12 and 15 months after randomization, most clients reported some problems walking about (79%), some problems performing their usual activities (79%), being in moderate or extreme pain (87%), and being moderately or extremely anxious or depressed (76%). This descriptive profile is consistent with the high risk scores that characterize this population.

Table II-3: Client responses to the EQ-5D[a] collected in a telephone survey administered 12-15 months after randomization[b]) (n=286)

Question	N	%
What statement best describes your mobility?		
I have no problems walking about	58	20%
I have some problems walking about	208	73%
I am confined to bed	17	6%
Missing	3	
What statement best describes your self-care?		
I have no problems with self-care	151	53%
I have some problems washing or dressing myself	108	38%
I am unable to wash or dress myself	25	9%
Missing	2	
What statement best describes your usual activities?		
I have no problems with performing my usual activities	60	21%
I have some problems with performing my usual activities	164	58%
I am unable to perform my usual activities	59	21%
Missing	3	
What statement best describes your pain or discomfort?		
I have no pain or discomfort	37	13%
I have moderate pain or discomfort	136	48%
I have extreme pain or discomfort	110	39%
Missing	3	
What statement best describes your anxiety or depression?		
I am not anxious or depressed	70	25%
I am moderately anxious or depressed	132	47%
I am extremely anxious or depressed	81	29%
Missing	3	

[a]EuroQol Group (2012, March). EQ-5D™. Retrieved March 12. 2012, from http://www.euroqol.org

[b]Krupski, T., Cristofalo, M., Jenkins. L., Atkins, D., Joesch, J. M., West, I. I., & Roy-Byrne, P. (2010, June). *Client Perspectives on the Rethinking Care Program: Report of a Telephone Survey.* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

Table II-4 summarizes client ratings of pain intensity at baseline. The vast majority of clients who participated in the in-person assessment reported that the pain they experienced in the last three months was moderate to severe in intensity (81%), that this pain interfered with their daily activities at a moderate or severe level (73.9%), and that it interfered with their ability to take part in recreational, social, and family activities at a moderate or severe level (64.9%).

Table II-4: Proportion of assessed clients who endorsed 0-10 numerical ratings of pain intensity[a] at baseline[b]

Question	Mild (1-3)	Moderate (4-6)	Severe (7-10)	Total
How would you rate your pain on a 0 to 10 scale at the present time? (n=185)[c]	35%	35%	30%	100%
In past 3 months, on average, how intense was your pain? (n=181)[d]	19.3%	28.2%	52.5%	100%
In the past 3 months, how much has pain interfered with your daily activities? (n=184)[e]	26.1%	26.1%	47.8%	100%
In the past 3 months, how much has pain interfered with your ability to take part in recreational, social, and family activities? (n=185)[f]	35.1%	18.4%	46.5%	100%

[a]McCaffery, M., & Beebe, A. (1993). *Pain: Clinical Manual for Nursing Practice.* Baltimore: V. V. Mosby Company
[b]Data derived from the KCCP data base assessment file.
[c]62 missing; [d]66 missing; [e]63 missing; [f]62 missing

Table II-5 summarizes results from the Patient Activation Measure (PAM) for assessed clients. One of the goals of the RTC intervention is to provide clients with the skills to better manage their own health care. At baseline, the majority of clients (73.3%) lacked confidence and skills to do this.

Table II-5: Proportion of assessed clients who score within each of the four levels of activation on the Patient Activation Measure (PAM)[a]at baseline (n=183).[b]

Activation Level	n	%
1: Starting to take a role. Individuals do not feel confident enough to play an active role in their own health. They are predisposed to be passive recipients of care.	57	31.2%
2: Building knowledge and confidence. Individuals lack confidence and an understanding of their health or recommended health regimen.	43	23.5%
3: Taking action. Individuals have the key facts and are beginning to take action but may lack confidence and the skill to support their behaviors.	34	18.6%
4. Maintaining behaviors. Individuals have adopted new behaviors abut may not be able to maintain them in the face of stress or health crisis.	49	26.8%

[a]Hibbard, J. H., Stockard, J., Mahoney, E. R., & Tusler, M. (2004). Development of the Patient Activation Measure (PAM): Conceptualizing and measuring activation in patients and consumers. *HSR: Health Services Research*, *39*(4), Part I, 1005-1026.
[b]Data derived from the KCCP data base assessment file.

III. CARE PLAN DATE ANALYSIS

The care plan date analysis was designed to assess the impact of the RTC intervention on clients who actually participated in the intervention by answering the following questions:

5) **Were there cost savings among those individuals who engaged in the program?**
6) **Were there other beneficial outcomes or "value added" among individuals who participated in the program?**

Results informing answers to these questions are presented in this section. The full answers are presented in the Discussion section.

Design

Here, we estimated the impact of the RTC intervention on outcomes for clients who set at least one care plan goal (hereafter RTC Participants; n = 251). For this group, the index date of the intervention was redefined from the date of randomization to the date of the client setting the first care plan goal. A propensity score-matched comparison group was selected from the original comparison group (n = 251), using age, gender, race/ethnicity and the following measures from the pre-period: number of Medicaid eligible months, total Medicaid medical costs, inpatient medical costs, long-term care costs, risk score,[23] an indicator of alcohol/drug treatment need, receipt of alcohol or drug treatment, presence of serious mental illness, days spent in a state psychiatric hospital, alcohol- and drug-related arrests, total arrests, and months homeless.

Statistical Analysis

The methods used for the care plan date analysis are similar to those used for the intent-to-treat analysis described above. Briefly, PMPM measures were used for costs and utilization to account for variation in time spent in the intervention across participants. All difference-in-differences regression models were weighted by the number of eligible post-intervention months and were adjusted for covariates that could confound relations between treatment and outcomes including age (measured in years), race/ethnicity, sex, baseline risk score as a measure of physical and mental health, an indicator of serious mental illness, and an indicator of need for alcohol and drug treatment. Robust standard errors were used to account for non-independence of the observations. Statistical significance was set at $p \leq 0.05$; findings with p-values ranging from $p > 0.05$ to $p \leq 0.10$ were highlighted as marginally significant.

As before, difference-in-difference estimates are interpreted as the **difference in the outcome for the RTC group relative to the comparison group in the post-period, taking into account differences in the outcome between the groups at baseline.**

[23] A medical cost risk score is built on an individual's expected per-member-per-month (PMPM) future expenditures divided by the average PMPM of the individual's medical coverage group. It is expressed as a ratio, with 1.0 equaling the "average" score for the group. A medical risk score of 1.5 would mean that the individual was likely to incur 50 percent more in future medical costs than the average member within the group. For further detail, see Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (pp.349-359). New York: John Wiley & Sons, Inc.

Results

Sample Characteristics (Table III-1)

After matching for the Care Plan Date Analysis, the RTC participants and comparison group members were similar at baseline with respect to sex, age, racial/ethnic composition, and risk scores. Approximately 65% in the RTC group and 67% in the comparison group were categorized as having serious mental illness (p=0.57). The percent of clients with alcohol or drug (AOD) treatment need or who engaged in specific alcohol or drug treatment services in the pre-period was also similar in both groups. By design, 100% of clients in the RTC group had completed the initial comprehensive assessment and had set at least one health-related care plan goal.

The two groups were similar in the length of time they were eligible for Medicaid in the pre-and post-periods. Thus, the average amount of available follow-up data was the same for both groups. In the pre-period, most outcome measures did not differ significantly between the two groups suggesting a closely matched comparison group **(Appendix C)**. A few notable exceptions reached statistical significance ($p \leq 0.05$) or were close to significantly different ($p > 0.05$ and $p \leq 0.10$). Specifically, relative to the comparison group, the RTC group had a:

a) Higher percent incurring long-term care costs (37% versus 28%; p=0.04),
b) Higher percent incurring any in-home support services (28% versus 21%; p = 0.08),
c) Higher percent incurring any inpatient medical costs (31% versus 23%; p = 0.04),
d) Lower percent incurring total psychiatric inpatient costs (6% versus 10%; p=0.07), and
e) Lower percent incurring community psychiatric inpatient costs (5% versus 9%; p=0.08).

Table III-1: Selected Pre- and Post-Period Measures for RTC Care Plan and Comparison Groups

	RTC Participants (Care Plan Group)	Comparison	
DEMOGRAPHICS	**n = 251**	**n = 251**	**p**
Mean Age in Years	50.2	49.6	0.52
(SD)[a] Range	(9.4) 22-83	(9.9) 21-84	-----
% Male	42.0%	42.0%	1.00
Race/Ethnicity			
White, Non-Hispanic	51.8%	53.0%	0.95
Black, Non-Hispanic	29.9%	30.3%	-----
Asian	6.4%	5.2%	-----
American Indian and Alaska Native	3.2%	2.0%	-----
Hispanic	6.8%	7.2%	-----
Other	2.0%	2.4%	-----
RISK PROFILE			
Mean Risk Score (DxRx)[b] Jan 2009, (SD) Range	2.5 (1.4) 1.5 - 15.8	2.4 (1.0) 1.5 - 10.4	0.48
Mean Risk Score (DxRx) in the prior 12 months (SD) Range	2.6 (6.5) 0.12 - 102.92	2.4 (1.9) 0.22-14.69	0.69
% Clients with Serious Mental Illness	64.9%	67.3%	0.57
MEDICAID ELIGIBILITY			
% Clients Eligible for Medicaid < 12 Months in Pre-period	2.8%	2.4%	0.78
Mean Months of Pre-period Eligibility, (SD) Range	11.9 (0.5) 7 - 12	11.9 (0.5) 6 - 12	0.73
Mean Months Post-period Eligibility, (SD) Range	16.5 (5.8) 1 - 24	16.3 (6.1) 1 - 24	0.73
Mean Months to Care Plan from Randomization, (SD) Range	5.7 (4.1) 0 - 15	-----	
ALCOHOL OR DRUG TREATMENT – PRE-PERIOD ONLY			
% Clients with Treatment Need	42.6%	43.8%	0.79
Inpatient Treatment			
% Clients with Any Cost	2%	2%	0.74
Mean Cost PMPM[c], $	$4	$5	0.85
(SD)	($35)	($60)	-----
Median Cost PMPM (Range), $	$0 ($0-$406)	$0 ($0-$911)	-----
Outpatient Treatment			
% Clients with Any Cost	14%	13%	0.69
Mean Cost PMPM, $	$14	$12	0.78
(SD)	($67)	($56)	-----
Median Cost PMPM (Range)	$0 ($0 - $696)	$0 ($0 - $657)	-----
Opiate Substitution			
% Clients with Any Cost	10%	10%	0.88
Mean Cost PMPM	$34	$29	0.61
(SD)	($109)	($96)	-----
Median Cost PMPM (Range)	$0 ($0 - $703)	$0 ($0 - $406)	-----

[a]SD = Standard Deviation

[b]See: Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (2011). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), *Medicaid Care Management Best Practices* (pp.349-359). New York: John Wiley & Sons, Inc. A risk score of 1.5 is interpreted as the client having predicted future health care costs at least 50% higher than those of the average Medicaid SSI client. A minimum risk score of 1.5 was required for program inclusion.

[c]PMPM = per member per month

*Statistically significant at $p<0.05$.

#Close to statistically significant ($p>0.05$ & ≤ 0.10)

Care Plan Date Analysis: Medical Costs and Service Use

In the Care Plan Date analysis, most medical cost and service use outcomes did not differ between the RTC and comparison groups **(Appendix C)** with the following exceptions (**Table III-2**):

- The number of clients with inpatient medical admissions increased in both groups, but the increase was greater in the comparison group. Thus, in the post-period, the RTC group on average had 1.8 fewer admissions per 100 members per month than the comparison group (p=0.09).
- Average total costs for medical inpatient admissions with emergency room use declined slightly in the RTC group and increased substantially in the comparison group between the pre- and post-periods. The RTC group had lower average costs than the comparison group by $321 in the post-period (p=0.02).
- The average number of inpatient medical admissions with emergency room use increased in both groups but by a greater amount in the comparison group. The RTC group had, on average, about 2 fewer admissions per 100 members per month in the post-period (p=0.02).
- Total costs for outpatient medical services increased slightly in the RTC group and declined in the comparison group. The RTC group had higher outpatient medical service costs by $94 in the post-period (p=0.10).
- Average total costs for prescription medications increased in the RTC group and declined in the comparison group, with the RTC group having higher average costs by $148 in the post-period (p=0.05).
- The percent of clients with narcotics costs increased in the RTC group and decreased in the comparison group, with 50% greater odds of incurring narcotics costs in the RTC group in the post-period (p=0.09).

Table III-2: Care Plan Date Analysis Results for Medical Costs and Service Use for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison)

Outcome Measure	Group RTC Participants: n=251 Comparison: n=251	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Medical Costs and Service Use						
Number of Inpatient Medical Admissions per 100 MPM	RTC Participants Comparison	6.4 5.9	6.9 7.1	+0.5 +1.1	-1.8	0.09#
Total Costs Inpatient Admissions with ER use PMPM	RTC Participants Comparison	$463 $508	$455 $757	-$8 +$249	-$321	0.02*
Number of Inpatient Admissions (with Emergency Room Visit) Per 100 MPM	RTC Participants Comparison	5 4.5	5.2 5.9	+0.20 +1.4	-2.10	0.02*
Total Costs Outpatient Medical PMPM	RTC Participants Comparison	$420 $419	$440 $367	+20 -52	$94	0.10#
PMPM Total Prescription Drug Costs	RTC Participants Comparison	$512 $493	$619 $449	+$107 -$44	$148	0.05*
% of Clients with Narcotics Costs	RTC Participants Comparison	74% 76%	78% 72%	+4% -4%	1.50	0.09#

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for any differences between the groups at baseline.** The d-did regression models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & ≤=0.10).

Care Plan Date Analysis: Long-Term Care Costs and Service Use

There were no statistically significant differences between the groups in most long-term care cost and service use variables. Exceptions that reached statistical significance are summarized in **Table III-3**.

Table III-3: Care Plan Date Analysis Results for Long-Term Care Costs and Service Use for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison)

Outcome Measure	Group RTC Participants: n=251 Comparison: n=251	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Medical Costs and Service Use						
% of Clients with Any Long-Term Care Costs	RTC Participants Comparison	37% 28%	45% 31%	+8% +3%	1.36	0.04*
PMPM Total Long-Term Care Costs	RTC Participants Comparison	$535 $573	$638 $609	+$103 +$36	$89	0.09#
% of Clients with Any In-Home Support Services	RTC Participants Comparison	28% 21%	38% 25%	+10% +4%	1.46	0.03*

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & <=0.10).

- The percent with any long-term care costs (i.e., sum of in-home services, assisted living, adult family home, arc, and nursing home costs) increased more in the RTC group than in the comparison group, resulting in 36% greater odds of long-term care costs (OR=1.36) for the RTC group in the post-period (p=0.04).
- Average total costs for long-term care (i.e., sum of in-home services, assisted living, adult family home, adult residential care, and nursing home costs) increased by a greater amount in the RTC group, leading to a higher average PMPM long-term care costs for the RTC group by $89 (p=0.09).
- The percent with in-home support services increased more in the RTC group resulting in 46% greater odds of in-home support services (OR=1.46) in the RTC group in the post-period (p=0.03).

Care Plan Date Analysis: Chemical Dependency Treatment

There were no statistically significant differences between the groups in most alcohol or drug treatment outcomes (**Table III-4)** including total cost (i.e., the sum of inpatient, outpatient, opiate substitution), inpatient, outpatient, opiate substitution and detox services. Three exceptions were:

- Between the pre- and post-periods, average total PMPM treatment costs increased in the RTC group and declined in the comparison group. Overall, the RTC group had $15 higher average PMPM total treatment costs in the post-period (p= 0.03).
- Between the pre- and post-periods, the percent of clients with any opiate substitution costs declined slightly in the comparison group and increased slightly in the RTC group. In the post-period, the RTC group had higher odds of incurring opiate substitution costs (1.45; p=0.09).
- Between the pre- and post-periods, average PMPM opiate substitution costs increased in the RTC group and declined in the comparison group. In the post-period, the RTC group had $9 higher average PMPM opiate substitution costs (p= 0.06).

Table III-4: Care Plan Date Analysis Results for Alcohol or Drug Treatment for Rethinking Care Clients (RTC) and Comparison Group Members (Comparison).

Outcome Measure	Group RTC Participants: n=557 Comparison: n=663	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Alcohol or Drug Treatment						
Total Average PMPM Treatment Costs (Inpatient, Outpatient or Opiate Substitution)	RTC Participants Comparison	$52 $47	$57 $34	+$5 -$13	$15	0.03*
Percent with Any Opiate Substitution Costs	RTC Participants Comparison	10% 10%	11% 9%	+1% -1%	1.45	0.09#
Total Average PMPM Opiate Substitution Costs	RTC Participants Comparison	$34 $29	$40 $26	+$6 -$3	$9	0.06#

[a]The pre-period represents up to 12 eligible months before a client's index month.

[b]The post-period represents up to 24 eligible months following the index month.

[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).

[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & ≤=0.10).

Care Plan Date Analysis: Mental Health Care

There were no statistically significant differences between the two groups in most mental health care outcomes including community inpatient psychiatric costs and admissions, state hospital days and costs or total psychiatric inpatient costs. One exception that reached statistical significance (**Table III-5**) was outpatient mental health visits. The percent of clients with outpatient mental health visits increased in the RTC group and decreased in the comparison group, with the RTC group having 28% greater odds of outpatient mental health visits in the post-period (p=0.08).

Table III-5: Care Plan Date Analysis Results for Other Outcomes for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison)

Outcome Measure	Group RTC Participants: n=251 Comparison: n=251	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[d]	P
Mental Health Care						
% of Clients with Outpatient Mental Health visits (from RSN data)	RTC Participants Comparison	22% 26%	25% 25%	+3% -1%	1.28	0.08[#]

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[c]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[d]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
[*]Statistically significant at p<0.05.
[#]Close to statistically significant (p>0.05 & ≤=0.10).

Care Plan Date Analysis: Other Outcomes

Most other outcomes did not differ significantly between the two groups including criminal arrests, charges, felony or gross misdemeanor charges, alcohol or drug arrests. There were two exceptions that reached statistical significance (**Table III-6**); both favored the RTC group.

- The percent of clients experiencing any homeless months—defined as months living in a shelter (battered spouse, emergency housing) or homeless with or without housing—decreased in the RTC group and increased in the comparison, resulting in 55% lower odds of homeless months (OR=0.45) for the RTC group in the post-period (p<0.01).
- In the post-period, the odds of death were 63% lower for the clients in the RTC group compared to those in the comparison group (p=0.06). There was no difference in the time to death (in months) between the groups (RTC = 10, Comparison 6; p=0.30).

Table III-6: Care Plan Date Analysis Results for Other Outcomes for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison)

Outcome Measure	Group RTC Participants: n=251 Comparison: n=251	Pre-Period[a] Average	Post-Period[b] Average	Difference[c]	D-I-D Estimate[c]	P
Other Outcomes						
% of Clients with Any Homeless Months	RTC Participants Comparison	10% 11%	8% 13%	-2% +2%	0.45	<0.01*
% Death in the Post-Period	RTC Comparison	----- -----	4% 6%	----- -----	0.37	0.06#

[a]The pre-period represents up to 12 eligible months before a client's index month.
[b]The post-period represents up to 24 eligible months following the index month.
[3]A positive net difference indicates that the change from pre- to post-period was positive (i.e., an increase); a negative difference indicates that change was negative (i.e., a decrease).
[c]All difference-in-difference (D-I-D) estimates are interpreted as the difference between the RTC group and the comparison group **in the post-period, after accounting for differences between the groups during the pre-period.** The d-i-d regression models included indicators of group assignment, time (pre- versus post), interaction of time x group assignment, risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post-period.
*Statistically significant at p<0.05.
#Close to statistically significant (p>0.05 & ≤=0.10).

Care Plan Data Analysis: Sensitivity Analyses

We conducted **s**ensitivity analyses to assess whether the care plan date findings were influenced by high end-of-life costs or service use among individuals who died in the post-period. We found no significant differences in study outcomes between the RTC and comparison groups in a sample limited to those individuals who died. When we re-estimated all D-I-D models after excluding deceased individuals from the sample, the findings were also not substantively different than those reported, with three exceptions. For the three exceptions, the D-I-D estimates were no longer significant for: a) the odds of incurring narcotics prescriptions costs (OR = 1.44; p=0.22); b) Average PMPM opiate substitution costs ($7.07; p = 0.15); c) Number of inpatient admissions with ER visit (per 100 members per month) (-1.4; p=0.20).

While it is plausible that the three exceptions were influenced, to some extent, by end-of-life costs or service use, it is also plausible that we diminished the power to detect significant effects by excluding deceased individuals from the sample. This latter explanation is supported by finding that in all three cases, the D-I-D point estimates were very similar to the reported results, however, the p-values were no longer significant. We conclude that high end-of-life costs were unlikely a major driver of the reported Care Plan Date findings

IV. SUBGROUP ANALYSES

7) Were there specific subgroups within the program participants who benefited more (or less) from the intervention?

Two sub-analyses—a cluster analysis and an effect modification analysis—aimed to determine if there were distinct subgroups of clients who participated in the RTC intervention and, if so, whether some subgroups benefited more than others from the RTC intervention. Results informing an answer to this question are presented in this section. The full answer is presented in the Discussion section.

Cluster Analysis

Design

Clients participating in the RTC project share certain characteristics. Specifically, clients were eligible for the program because they had at least one chronic physical condition, evidence of mental health problems and/or substance abuse, and a risk of future health care costs 50% or higher than the average Medicaid SSI client (i.e., risk score of 1.5 or higher). However, clinical impressions and previous qualitative research[24] suggests that there may be distinct subgroups of clients participating in the program. Identifying subgroups could focus treatment efforts and provide insight into important client characteristics that may moderate treatment effects. Cluster analysis was used to quantitatively explore whether there is evidence of distinct subgroups of clients among those participating in the RTC program.[25]

Statistical Analysis

As an initial step in the RTC program, clients completed a comprehensive in-person assessment of their health and social needs. Information from this assessment was the primary data source for the cluster analysis (obtained from the assessment file of the KCCP database), though it was augmented with items from the Client Outcomes Database (CODB).[26] Items included in the cluster analysis covered the following domains: 1) client's living situation (e.g., Who do they live with? Do they have reliable transportation?), 2) trauma history (e.g., Have they experienced emotional or sexual abuse?), 3) alcohol and drug use (e.g., quantity and frequency of alcohol and drug use), 4) mental health indicators, and 5) physical health indicators (e.g., Body Mass Index [BMI], problems with activities of daily living). All items included in the cluster analysis are shown in the Appendix in the order that they appear in Figure 1.

As described in Section II, of the 557 clients who were randomized to the RTC intervention, 51% (n = 285) completed a comprehensive assessment and 45% (n =251) set at least one health-related care plan goal, but only 3% (n = 237) had enough data to be included in the cluster analysis.

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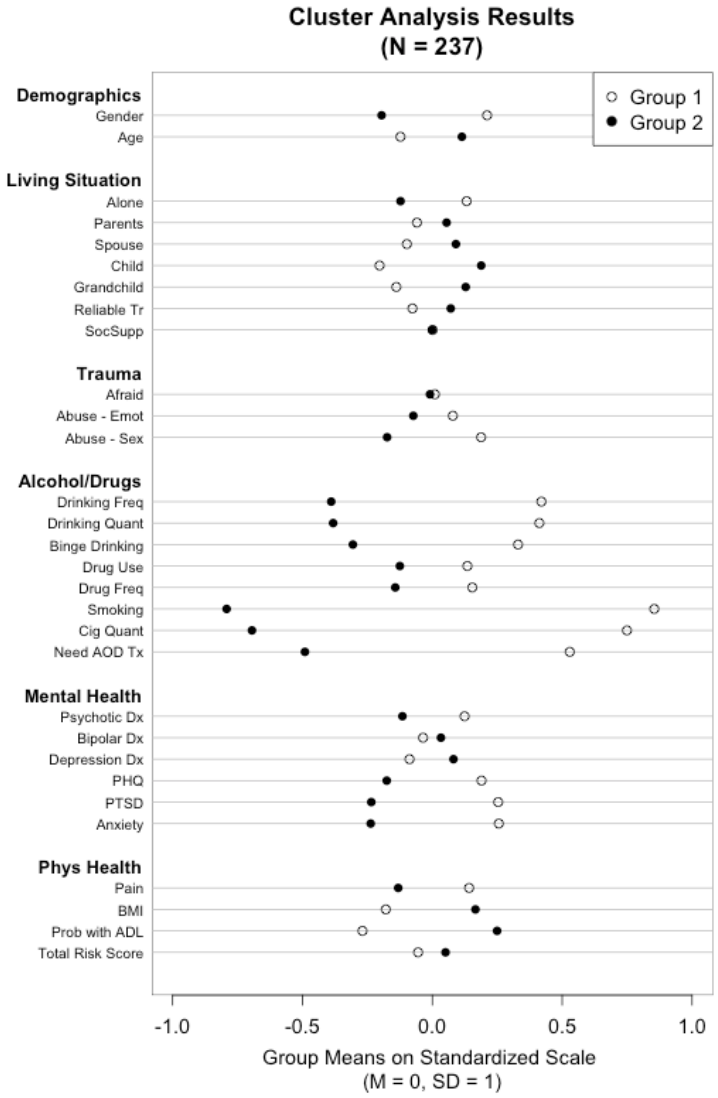
[24] Atkins, D., West, I. I., Krupski, T., Cristofalo, M., & Roy-Byrne, P. (2010, June). *Are There Distinct Subgroups of Rethinking Care Clients? A Cluster Analysis of Assessment Data*. Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

[25] Cluster analysis is a broad area of statistics focused on identifying latent groups. The current cluster analysis uses a relatively new, hybrid method that combines traditional approaches (i.e., k-means, agglomerative) into a single model. For details, see: Chipman, H., & Tibshirani, R. (2006). Hybrid hierarchical clustering with applications to microarray data. *Biostatistics, 7,* 286-301.

[26] Kohlenberg, L. (2009). *Integrated client database. Data that improves DSHS decision making and services* (Report No. 11.144) Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.

Results

Results strongly suggested two clusters of RTC clients. To interpret the results, the means of the two groups are plotted across all items in the Figure at right (after items were converted to a standardized scale, with M = 0 and SD = 1). Because of this scaling, the differences in means shown at right are approximately equal to Cohen's *d* effect size. As seen in the Figure, there is clear separation of the two groups across a number of items and categories:



- Group 1 (n = 123; open circles) is younger, more likely to live alone, and is also more likely to report a trauma history including emotional and sexual abuse. There is clear separation on drinking and drug use between groups, with Group 1 reporting notably higher means on all items. Moreover, clients in Group 1 are more likely to have significant psychiatric problems (e.g., psychotic disorder, depression [PHQ], PTSD, and anxiety).
- Group 2 participants (n = 114; solid circles) are more likely to be female, live with close relatives (i.e., child, spouse, grandchild), be overweight, and report problems with activities of daily living (ADL).

In summary, the cluster analysis supports two subgroups of RTC clients, in which one group is predominantly defined by alcohol and drug use, whereas the other group is defined by problems with obesity and ADL problems.

Effect Modification Analysis

Design

The effect modification analysis aims to identify whether specific subgroups of clients benefit more from the RTC intervention. Given the salience of drug or alcohol problems in the cluster analysis, all study outcomes were examined among those with and without alcohol or drug treatment need.[27]

Analysis

Statistical analysis was performed with the full sample randomized to the RTC or comparison groups using an intent-to-treat approach (i.e., including all individuals in the RTC group whether or not they participated in the intervention as described in Section I). The analysis was also repeated in the subset of clients who engaged in the RTC intervention to the point of setting a health-related care plan goal (Care Plan Date analysis subset) with a propensity-score matched comparison group as described in Section III.

Fully adjusted difference-in-differences (D-I-D) models as described in Section I and partial F-tests were used to test the significance of effect modification by alcohol and drug treatment need. If the partial F-test was significant (or close-to-significant), models were estimated separately by AOD treatment need.

Results

Outcomes by Alcohol/Drug Treatment Need: Intent-to Treat Analysis. **Table IV-1** presents outcomes ($p \leq 0.10$) by the presence of drug and alcohol treatment need prior to the start of the study. The analysis was designed to assess whether treatment differences between RTC and the comparison groups are associated with a client's drug and alcohol treatment need status. The results are based on the ITT sample (i.e., including all individuals in the RTC group whether or not they participated in the intervention). All D-I-D estimates are interpreted as the difference in the outcome for the RTC group relative to the comparison group in the post-period, taking into account differences between the groups measured in the pre-period.

Total Medicaid Medical Costs PMPM

- There was no evidence for differential effectiveness of the RTC intervention on average PMPM Medicaid medical costs by drug and alcohol treatment need (p = NS).[28]

Inpatient Medical, Any Costs

- There was significant differential effectiveness of the RTC intervention on the odds of incurring inpatient medical costs by client's AOD treatment need ($p<0.01$). **For clients with AOD treatment need**, the percent with any inpatient medical costs declined in the RTC group and increased in the comparison group. In the post-period, the RTC group had 41% lower odds of inpatient medical costs ($p=0.04$). Conversely, **for clients without AOD treatment need,** the percent with any inpatient medical costs increased in both groups between the pre and post-periods, but by a greater amount in the RTC group. Overall, the RTC group had 37% higher odds of inpatient medical costs ($p<0.01$) in the post-period. In summary, these findings suggest that the RTC intervention may have been

[27] Alcohol/drug treatment need was defined by the presence of a substance abuse diagnosis in Medicaid medical records and/or a substance abuse-related arrest in Washington State Patrol arrest records, and/or by a record of publically-funded alcohol/drug related service in state alcohol and drug treatment records. More detail on this approach can be found in: Sears, J. M., Krupski, A., Joesch, J. M., Estee, S. L., He, L., Shah, M. F., Huber, A., Dunn, C., Ries, R., & Roy-Byrne, P. P. (2010). The use of administrative data as a substitute for individual screening scores in observational studies related to problematic alcohol or drug use. *Drug and Alcohol Dependence*, *111*, 89-96.

[28] NS = not significant.

effective in lowering the odds of incurring inpatient medical costs only among those with AOD treatment need.

Inpatient Medical, Average Costs PMPM

- There was no evidence for differential effectiveness of the RTC intervention on average PMPM Inpatient medical costs by AOD treatment need (p = NS).

Inpatient Medical (with ER visit) Average Costs PMPM

- There was no evidence for differential effectiveness of the RTC intervention on average PMPM Inpatient medical costs (with ER visit) by AOD treatment need (p = NS).

Total Long-Term Care Costs PMPM

- There was significant differential effectiveness of the RTC intervention on average PMPM long-term care costs by client's AOD treatment need (p<0.01). **Among those with AOD treatment need**, there was no significant difference in average PMPM Long-Term Care costs between the RTC and comparison groups in the post-period. **Among those without AOD treatment need**, average total Long-Term Care costs increased significantly more in the RTC vs. comparison group. Overall, average PMPM costs in the post-period were higher only among those without AOD treatment need ($108; p<0.01).

Homeless Months, Any

- There was no evidence of differential effectiveness of the RTC intervention on the odds of having homeless months by client's AOD treatment need (p= NS).

Outcomes by Alcohol/Drug Treatment Need: Care Plan Date Analysis. **Table IV-2** presents outcomes ($p \leq 0.10$) by the presence of alcohol or drug (AOD) treatment need prior to the start of the study in the subset clients who engaged in the RTC intervention to the point of setting a health-related care plan goal (Care Plan Date analysis subset). Here, the comparison group was propensity-score matched to the RTC group. The analysis was designed to assess whether treatment differences between RTC and the comparison group are associated with a client's drug and alcohol treatment need status among those who took part in the intervention—an important consideration in light of the relatively low engagement rates. All D-I-D estimates are interpreted as the difference in the outcome for the RTC group relative to the comparison group in the post-period, taking into account differences between the groups measured in the pre-period.

Medicaid Medical, Average Costs PMPM

- There was significant differential effectiveness of the RTC intervention on average PMPM Medicaid medical costs by client's AOD treatment need (p=0.04). **Among clients with AOD treatment need**, the post-period average PMPM Medicaid medical costs were $739 lower for RTC clients relative to controls. Conversely, **among clients without AOD need**, average PMPM Medicaid medical costs for RTC individuals were $429 higher in the post-period relative to controls. This suggests that the intervention may hold down medical costs only among individuals with AOD treatment need.

Inpatient Medical, Any Costs

- There was significant differential effectiveness of the RTC intervention on the odds of incurring inpatient medical costs by client's AOD treatment need (p=0.10). **For clients with AOD treatment need**, the percent with any inpatient medical costs declined in the RTC group and increased in the comparison group. In the post-period, the RTC group had 55% lower odds of inpatient medical costs (p=0.08). Conversely, **for clients without AOD treatment need**, there was not a significant

difference in incurring any inpatient medical costs. This suggests the RTC intervention was effective in lowering the odds of incurring patient medical costs only among clients with AOD treatment need.

Inpatient Medical, Average Costs PMPM

- There was significant differential effectiveness of the RTC intervention on average PMPM inpatient medical costs by AOD treatment need (p=0.01). **For clients with AOD treatment need**, average PMPM inpatient medical costs declined in the RTC group and increased in the comparison group (net difference: -$929). **For clients without AOD treatment need**, average inpatient medical costs PMPM were not statistically significantly different between the RTC and comparison groups in the post-period. This suggests the intervention may have been more effective in lowering average PMPM inpatient medical costs only among individuals with AOD need.

Inpatient Medical (with ER visit), Average Costs PMPM

- There was significant differential effectiveness of the RTC intervention on average PMPM inpatient medical costs (with ER visit) by client's AOD treatment need (p=0.01). **For clients with AOD treatment need**, average PMPM inpatient medical (w/ER) costs declined in the RTC group and increased in the comparison group (RTC group $853 lower in post-period). In contrast, **for those without AOD treatment need**, these costs increased in the RTC group and declined in the comparison groups (RTC $54 higher in post-period). The intervention may have been effective in holding down increases in average PMPM inpatient medical costs relative to the comparison group only among individuals with AOD need.

Total Long-Term Care, Average Costs PMPM

- There was no evidence of significant differential effectiveness of the RTC intervention on average PMPM long-term care costs by client's AOD treatment need (p = NS).

Homeless Months, Any

- There was significant differential effectiveness of the RTC intervention on the odds of experiencing any homeless months by client's AOD treatment need (p=0.05). **Among those with AOD treatment need**, the percent with any homeless months declined in the RTC group and increased in the comparison group (OR=0.37). **Among those without AOD treatment**, there was no change in the odds of homeless months in either group; however, the percent was higher in the comparison group in both time periods (OR=0.87). This suggests the RTC intervention may have been effective in lowering the odds of experiencing homeless months only among those with AOD treatment need.

Table IV – 1: Differences in Outcomes by Alcohol or Drug Treatment Need: Intent-to-Treat Analysis

			Clients with Alcohol or Drug Treatment Need n = 521 (n = 247 RTC; n = 274 Comparison)										Clients without Alcohol or Drug Treatment Need n = 599 (n = 310 RTC; n = 289 Comparison)									
									Adjusted DID[a,b,c]										Adjusted DID[a,b,c]			
			Pre-period Average	p	Post-period Average	p	Unadjusted Difference	p	Est.	[95% CI]	p		Pre-period Average	p	Post-period Average	p	Unadjusted Difference	p	Est.	[95% CI]	p		EM p
Medical Costs and Services																							
Total Medicaid Medical	$	RTC	2,125	0.94	2,111	0.74	-14	0.77	-210	[-715, 295]	0.41		1,809	0.23	1,642	0.07	-167	0.33	**268**	**[-51, 587]**	**0.10**	#	NS
Mean Cost PMPM		Comp.	2,143		2,209		66		-----	-----	-----		1,594		2,084		490		-----	-----	-----		
Inpatient Medical	OR	RTC	**57%**	**0.05**	* 51%	0.44	**-6%**	**0.06**	# **0.59**	**[0.36, 0.96]**	**0.04**	*	30%	0.81	40%	0.07	-10%	0.18	1.37	[0.88, 2.14]	0.16		<0.01
Any Cost		Comp.	**48%**		54%		**6%**		-----	-----	-----		29%		33%		4%		-----	-----	-----		
Inpatient Medical	$	RTC	1,013	0.41	1,042	0.39	29	0.85	-151	[-600, 299]	0.51		594	0.63	723	0.53	129	0.80	104	[-137, 345]	0.40		NS
Mean Cost PMPM		Comp.	1,174		1,250		76		-----	-----	-----		530		609		79		-----	-----	-----		
Inpatient Medical (w/ ER Visit)		RTC	792	0.72	853	0.38	61	0.52	-160	[-545, 224]	0.41		420	0.13	546	0.40	126	0.90	-23	[-214, 169]	0.82		NS
Mean Cost PMPM		Comp.	849		1,046		197		-----	-----	-----		273		419		146		-----	-----	-----		
Long Term Care																							
Total Long Term Care[c]	$	RTC	251	0.90	340	0.55	89	0.27	-45	[-147, 56]	0.38		823	0.71	948	0.21	**125**	**0.04**	* **108**	**[8, 208]**	**0.04**	*	<0.01
Mean Cost PMPM		Comp.	243		385		142		-----	-----	-----		779		805		**26**		-----	-----	-----		
Other Outcomes																							
Homeless Months	OR	RTC	28%	0.67	22%	0.10	# -6%	0.38	0.81	[0.55, 1.19]	0.28		**4%**		**3%**	0.22	-1%	0.82	0.91	[0.44, 1.86]	0.80		NS
Any		Comp.	29%		28%		-1%		-----	-----	-----		**6%**	0.24	**5%**		-1%		-----	-----	-----		

[a]Difference-in-differences estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome in the post period for the treatment group relative to the comparison group taking into account any differences in the outcome between the groups in the pre-period.

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness and were weighted by the number of months of post-period eligibility

[c]Long Term Care is a sum of Aging and Disability Services Administration in-home services, assisted living, adult family home, adult residential care, and nursing home costs

[d]Abbreviations: DID = Difference-in-differences estimate; Est=Estimate; Comp= Comparison; PMPM = per member per month; OR = odds ratio; CI=Confidence interval; EM = effect modification; p = p-value

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & <=0.10).

Table IV – 2: Differences in Outcomes by Alcohol or Drug Treatment Need: Care Plan Date Analysis

			Clients with Alcohol or Drug Treatment Need n = 217 (n = 107 RTC; n = 110 Comparison)										Clients without Alcohol or Drug Treatment Need n = 285 (n = 144 RTC; n = 141 Comparison)									
									Adjusted DID[a,b,c]									Adjusted DID[a,b,c]				
			Pre-period Average	p	Post-period Average	p	Unadjusted Difference	p	Est.	[95% CI]	p		Pre-period Average	p	Post-period Average	p	Unadjusted Difference	p	Est.	[95% CI]	p		EM p
Medical Costs and Services																							
Total Medicaid Medical	$	RTC	2,023	0.76	1,987	0.18	-36	0.18	-739	[-1511, 34]	0.06	#	1,666	0.92	**1,930**	**0.09**	# 264	0.06	# 439	[-31, 909]	0.07	#	0.04
Mean Cost PMPM		Comp.	2,146		2,683		537		-----	-----	-----		1,643		**1,498**		-145		-----	-----	-----		-----
Inpatient Medical	OR	RTC	47%	0.47	43%	0.53	-4%	0.28	0.45	[0.18, 1.11]	0.08	#	30%	0.28	35%	0.12	5%	0.68	1.11	[0.51, 2.44]	0.79		0.10
Any Cost		Comp.	42%		47%		5%		-----	-----	-----		24%		27%		3%		-----	-----	-----		-----
Inpatient Medical	$	RTC	**957**	0.86	**816**	**0.06**	# **-141**	**0.04**	* -929	[-1595, -263]	<0.01	*	425	0.72	536	0.34	111	0.28	183	[-159, 524]	0.29		0.01
Mean Cost PMPM		Comp.	**1,017**		**1,623**		**606**		-----	-----	-----		476		398		-78		-----	-----	-----		-----
Inpatient Medical (w/ ER Visit)	$	RTC	719	0.87	**637**	**0.06**	# **-82**	**0.02**	* -853	[-1411, 296]	<0.01	*	274	0.76	320	0.76	46	0.59	53.81	[-174, 282]	0.64		0.01
Mean Cost PMPM		Comp.	767		**1,357**		**590**		-----	-----	-----		305		289		-16		-----	-----	-----		-----
Long Term Care																							
Total Long Term Care[c]	$	RTC	252	0.84	365	0.93	113	0.68	35	[-102, 172]	0.62		745	0.69	840	0.83	95	0.13	127	[-21, 275]	0.09	#	NS
Mean Cost PMPM		Comp.	270		355		85		-----	-----	-----		809		806		-3		-----	-----	-----		-----
Other Outcomes																							
Homeless Months	OR	RTC	20%	0.92	**13%**	**0.05**	* **-7%**	**0.03**	* 0.37	[0.17, 0.75]	<0.01	*	3%	0.12	3%	0.73	0%	1.00	0.87	[0.35, 2.15]	0.76		0.05
Any		Comp.	19%		**24%**		**5%**		-----	-----	-----		4%		4%		0%		-----	-----	-----		

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome in the post period for the treatment group relative to the comparison group taking into account any differences in the outcome between the groups in the pre-period.

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness and were weighted by the number of month of post-period eligibility

[c]Long Term Care is a sum of Aging and Disability Services Administration in-home services, assisted living, adult family home, adult residential care, and nursing home costsd by the number of month of post-period eligibility

[d]Abbreviations: DID = difference in differences estimate; Est=Estimate; Comp= Comparison; PMPM = per member per month; OR = odds ratio; CI=Confidence interval; EM = effect modification; p = p-value

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & <=0.10)

Because most clients without drug or alcohol treatment need did not receive AOD treatment, AOD outcomes could not be estimated for the effect modification analysis. **Table IV-3** shows the unadjusted percent of clients in the care plan analysis receiving different types of AOD treatment and the unadjusted average costs of each treatment type for the RTC and comparison groups stratified by AOD treatment need. Significant findings in the RTC group relative to the comparison group among clients with alcohol and drug treatment need include: a) higher average PMPM total AOD treatment costs; b) higher proportion of clients with any inpatient treatment costs; c) higher average PMPM inpatient treatment costs.

Table IV-3: Unadjusted Alcohol or Drug Treatment Outcomes for RTC versus Comparison Group Clients: Care Plan Date Analysis

			Clients with Alcohol or Drug Treatment Need n = 217 (n = 107 RTC; n = 110 Comparison)				Clients without Alcohol or Drug Treatment Need n = 285 (n = 144 RTC; n = 141 Comparison)				
			Pre-Period	p	Post-Period	p	Pre-Period	p		Post-Period	p
Any Treatment (Inpatient, Outpatient, OS[a])											
% Clients with Any Cost	%	RTC	52%	0.20	47%	0.16	**0%**	**0.02**	*	2%	0.68
		Comp.	44%		37%		**4%**			3%	
Mean Cost PMPM[b], $	$	RTC	$122	0.47	**$129**	**0.02**	$0	0.18		$3	0.77
		Comp.	$104		**$76**		$2			$2	
Inpatient Treatment											
% Clients with Any Cost	%	RTC	5%	0.23	**9%**	**0.04**	0%	0.15		1%	0.55
		Comp.	2%		**3%**		1%			1%	
Mean Cost PMPM, $	$	RTC	$10	0.97	**$13**	**0.02**	$0	0.24		$1	0.83
		Comp.	$19		**$2**		$1			$1	
Outpatient Treatment											
% Clients with Any Cost	%	RTC	33%	0.31	23%	0.44	**0%**	**0.08**	#	2%	0.98
		Comp.	26%		19%		**2%**			2%	
Mean Cost PMPM, $	$	RTC	$32	0.71	$23	0.38	$0	0.11		$1	0.31
		Comp.	$27		$15		$0			$1	
Opiate Substitution											
% Clients with Any Cost	%	RTC	22%	0.96	26%	0.36	0%	1.00		0%	1.00
		Comp.	23%		21%		0%			0%	
Mean Cost PMPM, $	$	RTC	$80	0.52	$94	1.00	-----	-----		-----	-----
		Comp.	$67		$60		-----			-----	
Alcohol and Drug Related Detox											
% Clients with Any Cost	%	RTC	7%	0.33	6%	0.29	0%	0.31		1%	0.55
		Comp.	4%		3%		1%			1%	
Mean Cost PMPM, $	$	RTC	$7	0.53	$3	0.25	$0	0.31		$1	0.44
		Comp.	$15		$1		$1			$1	

[a]OS = opiate substitution treatment

[b]PMPM = per member per month

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & ≤=0.10).

DISCUSSION

Summary and Interpretation

This evaluation of the Washington State Rethinking Care (RTC) program followed clients up to 24 months post-randomization and was designed to answer seven specific questions. In what follows, results are synthesized in answers to each evaluation question.

1) From a policy perspective, were there cost savings associated with providing the RTC intervention to the target population?

Using an intent-to-treat (ITT) approach, we estimated the effects of offering RTC to the target population by comparing changes in outcomes for all clients randomized to receive the RTC intervention to those randomized to a comparison group. Because many of those offered the RTC intervention did not engage in it, the results of the intent-to-treat evaluation provide conservative "real world" estimates of effects in the target population that take into account that there will always be individuals who do not engage in an available intervention.

Taken together, findings from the ITT analysis do not provide evidence for cost savings in the target population. In fact, the RTC group incurred slightly higher average costs for some health services than did the comparison group, which suggests the RTC invention may help to improve access to care or lead to more intense service use for this high-risk population—with concomitantly higher costs, at least in the short term. (See also question 3).

Several points are important to consider in interpreting this conclusion. First, only 51% (n = 285) of clients who were offered the RTC intervention completed an in-person comprehensive assessment of medical and social needs and 45% (n = 252) set at least one health-related care plan goal. Thus, half of the study population did not engage in the services offered. Moreover, for those who began the program, the time from randomization to in-person assessment ranged from 0 to 15 months (mean 6) and the time from randomization to the first care plan goal ranged from 0 – 16 months (mean 7). Consequently, many participants experienced a delay in service onset. Low engagement rates, delayed service onset with subsequently shorter follow-up periods, and unobserved differences in the characteristics of the individuals who engaged in the program—or perhaps more importantly of those who did not—may offer explanations for the few differences that emerged between the intervention and comparison groups or for the lack of cost savings. Second, the intervention targeted a high-risk population known to have very high and often variable costs. This inherent cost variability may make it more difficult to detect effects of the intervention. Third, many of the clients in our sample had fewer than 24 months of data available in the post-period. It is quite likely that changes in the types of outcomes examined take longer than 24 months to emerge. Findings from studies of collaborative care interventions suggest that savings may not be apparent in the first few years.[29] Moreover, the RTC intervention changed only one part of the care system – at the client-level. It did not include system changes at the provider- or payer-levels such as primary care provider (PCP) communication, PCP office-based care management, payment reform or other cost containment strategies. Finally, based on findings from our sensitivity analyses, we conclude that high end-of-life costs were unlikely a major driver of the reported findings.

[29] Unützer, J., Katon, W. J., Fan, M., Schoenbaum, M. C., Lin, E. H. B., Penna, R. D. D., & Powers, D. (2008). Long-term cost effects of collaborative care for late-life depression. *The American Journal of Managed Care*, 14(2), 95-100.

What is the Return on Investment? In the context of the RTC project, return on investment (ROI) addresses how changes in health care expenditures due to the RTC intervention compare to the cost of the RTC program. More specifically, ROI is a benefit-cost ratio defined as:

$$\text{ROI} = \frac{\text{Savings from Changes in Health Care Utilization due to RTC}}{\text{Program Cost}}$$

When ROI is greater than 1, savings resulting from the program are larger than the cost of its operation. An ROI of 1.3, for example, suggests that for every $1 spent running the program, $1.30 will be saved in health care expenditures. In contrast, a negative ROI indicates that the program does not generate any savings. If ROI is -1.5, for instance, then for every $1 spent operating the program, $1.50 will be spent in additional health care expenditures as a result of the program. Lastly, when ROI is between 0 and 1, the program generates savings, but the savings are insufficient to cover program cost. Thus, an ROI of 0.7, for example, means that for every $1 spent on the program, 70 cents will be saved in health care expenditures.

The administrative cost of the RTC program was estimated to be $552.71 PMPM, including infrastructure cost for the Medical Home. Because the ITT analysis did not provide evidence of savings in health care expenditures, the return on investment for the RTC intervention is negative at this time.

2) Aside from costs, were there other beneficial outcomes or "value added" by providing the RTC intervention to the target population?

Significant findings from the ITT analysis (which focuses on members of the target population regardless of program engagement) indicate that relative to the comparison group, a higher proportion of RTC clients received outpatient mental health services, RTC clients had higher average prescription drug costs, higher average total and inpatient AOD treatment costs, and a higher proportion of RTC clients had any narcotics costs following the intervention. Taken together, these findings may reflect increased access to needed health care for RTC clients. For instance, a high proportion of the target population has serious mental illness. Thus, increased access to outpatient mental health services could indicate improved mental health care. Future research is recommended to assess whether such improvements forestall costly inpatient admissions.

Also, we found a high proportion of RTC program participants had moderate to severe pain. Given randomization, presumably the remainder of the target population and the comparison group would endorse similarly high ratings. Thus, higher prescription drug costs and a higher proportion of clients with narcotics costs could be a reflection of access to chronic pain management. Here, we can only speculate as we had neither data on dose, nor type of prescriptions, nor narcotics prescribed.

The current findings regarding drug or alcohol treatment indicate little change in alcohol/drug treatment costs in the RTC group while these costs decreased in the comparison group between the pre-and post-period. These results are consistent with intensive care management leading to referrals to needed services such as inpatient alcohol and drug treatment. Although alcohol and drug treatment costs were higher for the intervention group in the short run, the treatment could pay future dividends in other improved outcomes, including decreased criminal activity or improved physical health. There were also lower odds of death in the post-period in the RTC group relative to the comparison group, although this finding did not reach statistical significance (p=0.10).

Unexpectedly, other findings from the ITT analysis appeared to favor the comparison group, with the RTC group having relatively higher odds of criminal conviction, a higher average number of criminal convictions, lower odds of adult family home services and slightly higher average inpatient admissions (without an ER visit). In these cases, the outcomes were not balanced at baseline, with the comparison group having higher average inpatient admissions, greater proportion with criminal convictions and a lower proportion with ADSA adult family home services in the pre-period. Accordingly, the unexpected findings could reflect regression to the mean in the comparison group.

3) What were the characteristics of the individuals who chose to participate in the program and how did they differ from those who did not?

In the current evaluation and in our prior report,[30] we found few differences between individuals who chose to participate in the program relative to those who did not. Specifically, we found program participants were more likely to be female and more likely to receive Aging and Disability Services Administration (ADSA) in-home support services in the pre-period. Women are known to be more likely to participate in health services than are men.[31] Clients receiving in-home services from ADSA may have been more likely to participate in the RTC intervention since they were already closely tied to a related system of services.

4) Were there cost savings among those individuals who engaged in the program?

In the Care Plan Date analysis, the RTC cohort was restricted to clients who engaged in the intervention at least to the point of collaborating with a care manager to set one health-related goal. This analysis was designed to detect the impacts of the intervention, if such impacts exist, by capturing engagement with the RTC program. In the current analysis, overall medical costs were not reduced but we found evidence of reductions in inpatient admissions and related costs relative to the comparison group.

5) Are there other beneficial outcomes or "value added" among individuals who participated in the program?

Comparing outcomes of the subset of clients who developed a care plan goal with those of a propensity score matched comparison group, findings of relatively higher outpatient medical costs and higher odds of outpatient mental health costs support the conclusion of increased access to care or more intense use of services. We also found evidence that the intervention may slow the growth in total inpatient costs (with ER admission) and numbers of inpatient admissions. The results suggest that RTC clients' patterns of service use may be more appropriate than those of the comparison group.
In the subgroup who participated in the RTC program, AOD treatment outcomes suggested benefits from the RTC intervention including higher average total treatment costs, higher average opiate substitution costs and higher odds of receiving opiate substitution treatment. These findings are consistent with improved access to AOD treatment. RTC program participants also experienced lower odds of homeless months and death.

[30] West, I. I., Joesch, J. M., Atkins, D., Krupski, T., Cristofalo, M., Jenkins L., Roy-Byrne, P. (2010). *Clients Assigned to the Rethinking Care Program Intervention: How Do Clients Who Started an Assessment Differ from Those Who Did Not?* Seattle, Washington: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.
[31] Rosenstock, I. M. (2005). Why people use health services. *The Milbank Quarterly*, *83*(4), 1-32;
Wilensky, G. R. & Cafferata, G. L. (1983). Women and the use of health services. *The American Economic Review*, *73*(2), 128-133.

Only 18% of eligible clients offered the 2007 KCCP pilot intervention initiated an assessment; presumably, even fewer completed the assessment. In the design of the RTC intervention, a variety of techniques[32] were systematically employed to improve engagement rate including expert consultation and client outreach efforts by a skilled survey research team. Our findings indicate improvements in client engagement with 51% of the sample initiating a comprehensive assessment and 45% setting at least one care plan goal.

Although program engagement rates were relatively low overall and many client experienced delays in service onset, the clients who did participate to the point of setting a health-related goal had numerous contacts with the program. The mean number of total contacts with the care manager was 80 (SD = 59; median 64; range 9 – 404). Total contacts include both client contacts (i.e., in-person or telephone; mean = 31; SD = 29; median = 23; range 1 – 191) and collateral contacts (i.e., contacts with other service providers on behalf of the client; mean = 49; SD = 33; median = 42; range 5 – 213). Furthermore, many clients remained engaged with the program (mean annual days = 362; SD = 171; median 362; range 6 – 1,039).

In contrast to the ITT analysis, the criminal conviction results in the Care Plan Date analysis were not significant, the inpatient admission finding pointed to significantly fewer admissions in the RTC group, and the RTC group had higher odds of long-term care services. Accordingly, we tentatively conclude that the unexpected findings in the ITT analysis are unlikely to be direct results of participating in the intervention.

6) Were there specific subgroups within the program participants who benefited more (or less) from the intervention?

Results of the cluster analyses indicate two distinct groups of clients participating in RTC. One group reports significant alcohol and drug use, significant abuse history, isolated living situation, and significant mental health problems. In contrast, a second group is more likely to be married, report social support, report few alcohol/drug problems, but is more likely to report physical health problems that interfere in their daily functioning. Broadly, these results describe a set of clients with primarily addiction/mental health problems and a second with primarily physical health problems. In the absence of external validation, all cluster analyses should be considered descriptive as opposed to definitive. In addition, the cluster analyses were hampered somewhat by a significant revision to the assessment tool that occurred part way through the RTC program. Hence, only items common to both the original and revised assessment tools could be used in the analysis.

To assess whether the two client groups identified in the cluster analysis might relate to outcomes (i.e., healthcare utilization and costs), we tested for effect modification using an indicator of alcohol and/or drug (AOD) treatment need. We found evidence that the intervention may be effective at bending the cost curve for total Medicaid medical costs among clients with AOD treatment need. This finding appears to be driven by cost savings through prevention of expensive inpatient admissions which, in turn, results in lower average costs for these admissions, especially for unplanned admissions with concurrent emergency room visits. In addition to medical cost savings, the intervention has other important value for clients with AOD treatment need by lowering the odds of being homeless.

[32] Court, B. (2010, July). *Enhanced Client Engagement Project Report*. Olympia, WA: Washington State Medicaid Purchasing Administration, Office of Quality and Care Management.

An important reason for the differential impact of the intervention on clients with need for AOD treatment may be that this subset of clients was more likely to receive AOD treatment as a part of the intervention. There is ample evidence that AOD treatment is frequently associated with reduction in medical costs and other outcomes.[33] Since higher long-term care costs in the group without AOD treatment need were apparent only in the intent-to-treat analysis, and not in the analysis of clients who participated in the intervention, it appears more likely that this finding is due to changes in costs among those who did not participate in the RTC program, rather than a direct result of the intervention itself.

Study Strengths and Limitations

The current evaluation has at least three strengths, including: 1) the randomized controlled design; 2) the D-I-D approach which accounts for changes in outcomes that occur over time for reasons over and above the intervention itself (assuming the impacts are the same in both groups, for example due to aging, disease progression, or secular trends in treatment and health service delivery; and 3) the use of weighting by eligible post-member months to account for differences in length of follow-up.

Important limitations must be considered as well. First, the care plan date analysis findings may be subject to selection bias. Non-observable characteristics, that we could not account for, could lead to a non-equivalent comparison group. Although considerable work in statistics supports the use of the propensity score method to address selection bias or other threats to randomization, the approach assumes that relevant covariates are captured in the score, and that there is no unmeasured confounding.[34,35,36] In our sample, the propensity score method could not create a control group that exactly matched the RTC group, so the groups differed on a few of the measured variables in the pre-period. A second possible limitation is the problem of multiple comparisons. With many outcomes examined, some associations could be statistically significant due to chance. Third, the finding of lower inpatient costs and admissions (with a preceding emergency room visit) in the care plan date analysis support the interpretation of improved access and more appropriate service use among RTC clients. However, the inpatient cost finding was sensitive to the removal of one client in the comparison group with very high costs. Similar cost outliers may influence other reported findings; however, from a population-based perspective, it remains important to consider such outliers in the analysis—indeed, in this high-risk sample, the RTC intervention itself may serve to prevent excessive costs among program participants. Fourth, and related, the intervention targeted a high-risk population known to have very high and often variable costs. This inherent cost variability may make it more difficult to detect effects of the intervention. Finally, many of the clients in our sample had fewer than 24 months of data available in the post-period. It is possible that changes in the outcomes we examined take longer than

[33] Mancuso, D., Shah, M. F., Huber, A., & Felver, B. (2011). *The Health Impact of Substance Abuse: Accelerating Disease Progression and Death* (Report No. 4.85). Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.
Mancuso, D., & Felver, B. E. M. (2010). *Bending the Health Care Cost Curve by Expanding Alcohol/Drug Treatment* (Report No. 4.81). Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.
Wickizer, T. & Lucenko, B. (2009). *Chemical Dependency Treatment Reduces Risk of Death by 30 Percent for GA-U Clients* (Report No. 4.73). Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.
Nordlund, D. J., Mancuso, D., & Felver, B. (2004). *Chemical Dependency Treatment Reduces Emergency Room Costs and Visits* (Report No. 11.120fs). Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division.
[34] Posner, M. A., Ash, A. S., Freund, K.M., Moskowitz, M. H., Schwartz, M. (2001). Comparing Standard Regression, Propensity Score Matching, and Instrumental Variables Methods for Determining the Influence of Mammography on Stage of Diagnosis. *Health Services & Outcomes Research Methodology,* 2:279-290.
[35] D'Agostino, R. B., Jr. (1998). Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Statistics in Medicine*., 17(19):2265-2281.
[36] Peikes, D., Moreno, L., & Orzol, S. M. (2008). Propensity score matching: A note of caution for evaluators of social programs. *The American Statistician*, 62, 222-231.

24 months to emerge. Future study is recommended over a longer post-period and in larger samples, particularly given the low prevalence of some outcomes.

Conclusions

In summary, this evaluation finds few cost savings in the target population likely due to fairly low rates of program participation and the short follow-up period. Even still, other benefits were apparent including improved access to health care and AOD treatment and lower odds of death. Results of the analysis restricted to those who participated in the program suggest that intensive care management may increase access to needed care, slow growth in cost and number of hospitalizations, and prevent homelessness and death. Such benefits may accrue, in particular, to clients with documented need for alcohol or drug treatment possibly because the intervention resulted in their receiving alcohol or drug treatment. These findings may be applicable to clients who engage in other start-up, care management programs targeted to hard-to-reach populations—and in particular, to high-cost, high-risk Categorically Needy Blind, Aged, and Disabled Medicaid clients with a high prevalence of addiction, serious mental illness and other chronic conditions.

Recommendations

- Offer intensive care management services to high-risk, high cost Medicaid clients. Findings from this evaluation suggest potential cost savings in expensive inpatient care as well as other benefits such as reduction in homelessness and death among those who engage in such interventions--and, in particular, among individuals with drug and alcohol treatment need.

- Future evaluations are recommended over longer time horizons. Given the complex chronic health conditions in the study population, it is likely that it takes longer than two years to see the full effects of care management interventions.

- Qualitative and quantitative studies should be designed to understand why some individuals do not engage in care management when offered. Intensive outreach efforts demonstrated in the current study were successful. Even still, half of those offered the intervention did not participate, while the evaluation indicates benefits among those who did participate.

- In future studies, request that CMS make exceptions to restricting randomized designs to one year in order to allow longer follow-up of clients.

APPENDIX A: CRITERIA FOR INCLUSION IN RTC STUDY

- Enrolled in Medicaid Categorically Needy Aged, Blind, or Disabled coverage at the point of randomization
- Not dually eligible for Medicare at the point of randomization
- Age 21+ at the point of randomization
- Residing in King County at the point of randomization
- The minimum risk threshold is 50% above the average level of risk for this population
- Received at least one service from a provider in the KCCP "network" in the prior 12 months
- At least one "chronic physical" condition identified in the prior 12 months, as measured by the CDPS risk scoring model (see the attached diagnostic (Dx) profile and exclude Psychiatric and Substance Abuse Diagnostic categories)
- An indication of either mental illness (MI) or substance abuse (SA) problems (they could be co-occurring). MI flagged by:
    - MI Dx in MMIS claims or Healthy Options encounters in prior 12 months
    - MI Rx in MMIS claims or Healthy Options encounters in prior 12 months in one of the following classes:
        - Anti-depressant
        - Anti-anxiety
        - Anti-psychotic
        - Anti-mania
    - Received service through the DSHS MHD in prior 12 months:
        - Outpatient Mental Health Treatment through the Regional Support Network (RSN). (The RSN is where the vast majority of DSHS mental health services are provided)
        - Community psychiatric hospitalizations
        - State mental hospital stay
- SA problems flagged by:
    - SA Dx in MMIS claims or Healthy Options encounters in prior 12 months
    - SA Tx or detox in MMIS or TARGET data in prior 12 months
    - SA-related arrest in prior 12 months in Washington State Patrol (WSP) arrest database, including primarily possession, sale, manufacturing of illicit drugs
    - DUI offenses

The following exclusion restrictions were imposed (clients meeting any of these criteria were dropped prior to randomization):

- In skilled nursing facility at point of randomization
- End Stage Renal Disease (ESRD) or HIV/AIDS Dx in prior 12 months
- In Hospice at point of randomization
- Has third-party liability at point of randomization
- Clients with a pregnancy-related diagnosis

APPENDIX B: FULL RESULTS FROM THE INTENT-TO-TREAT ANALYSIS

Intent to Treat Analysis Sample: Medical Costs and Service Use

		PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	n	RTC 557	Control 563	p	RTC 557	Control 563	p	RTC 557	Control 563	p		Est.	[95% CI][c]	p
Total Medicaid Medical														
Any Cost, %		100	100	1.00	99	99	0.31	-1	-1	0.31	OR[c]	-----	-----	-----
Mean Cost PMPM[c], $		1,948	1,861	0.55	2,095	1,918	0.34	147	57	0.61	$	51	[-242, 344]	0.73
(SD)		(2,296)	(2,568)	-----	(2,953)	(3,274)	-----	(2,816)	(3,194)	-----		-----	-----	-----
Median Cost PMPM, $		1,225	1,150	-----	1,097	1,002	-----	-----	-----	-----		-----	-----	-----
(Range)		(14-19,102)	(11-25,371)	-----	(0-22,556)	(0-33,441)	-----	-----	-----	-----		-----	-----	-----
Emergency Room														
Any Cost, %		71	71	0.98	72	73	0.71	1	2	0.78	OR	0.96	[0.67, 1.38]	0.83
Mean Cost PMPM, $		125	104	0.11	103	94	0.46	-297	-250	0.23	$	-8	[-26, 10]	0.38
(SD)		(247)	(179)	-----	(225)	(177)	-----	(172)	(156)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-2,083)	(0-1,499)	-----	(0-2,629)	(0-1,957)	-----	-----	-----	-----		-----	-----	-----
Mean Visits Per 100 MPM, n		34	31	0.33	28	26	0.45	-6	-5	0.67	n	-0.29	[-5.09, 4.51]	0.91
(SD)		(70)	(51)	-----	(66)	(43)	-----	(43)	(40)	-----		-----	-----	-----
Median Visits Per 100 MPM, n		0	0	-----	8.3	12.5	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-9)	(0-4)	-----	(0-842)	(0-308)	-----	-----	-----	-----		-----	-----	-----
Oupatient Medical[d]														
Any Cost, %		100	100	0.16	98	98	0.80	-2	-2	0.84	OR	-----	-----	-----
Mean Cost PMPM, $		389	359	0.35	400	344	0.18	11	-14	0.51	$	31	[-47, 109]	0.43
(SD)		(576)	(492)	-----	(867)	(436)	-----	(735)	(528)	-----		-----	-----	-----
Median Cost PMPM, $		238	226	-----	250	220	-----	-----	-----	-----				
(Range)		(0-7,202)	(5-5,614)	-----	(0-17,067)	(0-4,139)	-----	-----	-----	-----				
Mean Visits PMPM, n		4.6	4.4	0.45	4.6	4.5	0.54	0.07	0.08	0.95	n	-0.11	[-0.51, 0.28]	0.58
(SD)		(4.0)	(3.8)	-----	(4.4)	(4.4)	-----	(3.69)	(3.56)	-----		-----	-----	-----
Median Visits PMPM, $		3.5	3.4	-----	3.3	3.2	-----	-----	-----	-----		-----	-----	-----
(Range)		(0 - 35.7)	(0 - 34.2)	-----	(0 - 35)	(0 - 36)	-----	-----	-----	-----		-----	-----	-----
Inpatient Medical														
Any Cost, %		42	39	0.24	45	43	0.60	3	4	0.59	OR	0.92	[0.66, 1.27]	0.60
Mean Cost PMPM, $		780	843	0.59	865	921	0.70	85	78	0.96	$	-12	[-260, 236]	0.92
(SD)		(1,749)	(2,153)	-----	(2,078)	(2,828)	-----	(2,323)	(2,868)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-16,373)	(0-23,519)		(0-18,964)	(0-31,440)		-----	-----	-----		-----	-----	-----
Mean Admissions Per 100 MPM, n		7.3	7.5	0.85	8.1	7.7	0.67	0.82	0.21	0.50		0.33	[-1.24, 1.90]	0.42
(SD)		(15.7)	(12.4)	-----	(17.0)	(17.3)	-----	(15.22)	(14.95)	-----		-----	-----	-----
Median Admissions Per 100 MPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0 - 108)	(0 - 166)	-----	(0-130)	(0-144)	-----	-----	-----	-----		-----	-----	-----

		PRE - PERIOD				POST - PERIOD				UNADJUSTED DIFFERENCE				ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	n	RTC 557	Control 563	p		RTC 557	Control 563	p		RTC 557	Control 563	p			Est.	[95% CI][c]	p
With No ER Visit																	
Any Cost, %		13	17	0.13		18	18	0.75		5	1	0.65		OR	1.39	[0.89, 2.16]	0.15
Mean Cost PMPM, $		**195**	**290**	**0.10**	#	183	197	0.77		-13	-92	0.29		$	73	[-35, 181]	0.18
(SD)		(844)	(1,077)	-----		(658)	(976)	-----		(1,067)	(1,419)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-12,462)	(0-12,408)	-----		(0-6,264)	(0-18,678)	-----		-----	-----	-----			-----	-----	-----
Mean Admissions Per 100 MPM, n		1.5	1.8	0.18		1.6	1.3	0.27		**0.11**	**-0.53**	**0.06**	#	n	**0.50**	**[-0.07, 1.07]**	**0.09** #
(SD)		(4.3)	(4.5)	-----		(5.0)	(3.6)	-----		(6.3)	(5.1)	-----			-----	-----	-----
Median Admissions Per 100 MPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-50)	(0-25)	-----		(0-67)	(0-33)	-----		-----	-----	-----			-----	-----	-----
With ER Visit																	
Any Cost, %		35	30	0.11		39	36	0.32		4	6	0.17		OR	0.96	[0.69, 1.35]	0.83
Mean Cost PMPM, $		585	554	0.73		682	724	0.75		98	170	0.56		n	-86	[-294, 122]	0.42
(SD)		(1,414)	(1,626)	-----		(1,928)	(2,419)	-----		(1,973)	(2,243)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-13,890)	(0-15,366)	-----		(0-18,964)	(0-31,441)	-----		-----	-----	-----			-----	-----	-----
Mean Admissions Per 100 MPM, n		5.8	5.7	0.80		6.6	6.4	0.87		0.70	0.74	0.96		n	-0.17	[-1.55, 1.22]	0.81
(SD)		(11.2)	(13.7)	-----		(15.9)	(15.7)	-----		(13.7)	(13.0)	-----			-----	-----	-----
Median Admissions Per 100 MPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-100)	(0-142)	-----		(0-1,300)	(0-1,444)	-----		-----	-----	-----			-----	-----	-----
In Home Support Services																	
Any Cost, %		22	20	0.41		27	24	0.20		5	4	0.42		OR	1.12	[0.90, 1.37]	0.31
Mean Cost PMPM, $		290	297	0.87		354	352	0.97		62	56	0.13		$	12	[-28, 52]	0.56
(SD)		(727)	(817)	-----		(784)	(869)	-----		(301)	(334)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-5,376)	(0-9,455)	-----		(0-5,240)	(0-9,611)	-----		-----	-----	-----			-----	-----	-----
Out of Home Long Term Care																	
Any Cost, %		**13**	**9**	**0.04**	*	**16**	**12**	**0.03**	*	3	3	0.25			0.88	[0.60, 1.31]	0.54
Mean Cost PMPM, $		279	220	0.30		325	246	0.17		47	26	0.49			24	[-42, 89]	0.48
(SD)		(961)	(925)	-----		(1,046)	(902)	-----		(484)	(563)	-----					
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----					
(Range)		(0-6,237)	(0-6,259)	-----		(0-5,972)	(0-6,067)	-----		-----	-----	-----					
Total Long Term Care																	
Any Cost, %		**32**	**27**	**0.05**	*	**40**	**33**	**<0.01**	*	8	6	**0.04**	*	OR	1.09	[0.88, 1.35]	0.42
Mean Cost PMPM, $		569	518	0.47		678	600	0.28		109	82	0.43		$	36	[-35, 107]	0.33
(SD)		(1,147)	(1,191)	-----		(1,203)	(1,225)	-----		(558)	(598)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----
(Range)		(0-6,237)	(0-9,455)	-----		(0-5,972)	(0-9,611)	-----		-----	-----	-----			-----	-----	-----

		PRE - PERIOD				POST - PERIOD				UNADJUSTED DIFFERENCE				ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	n	RTC 557	Control 563	p		RTC 557	Control 563	p		RTC 557	Control 563	p			Est.	[95% CI][c]	p	
Prescription Drugs																		
Any Cost, %		99.6	99.1	0.25		98.6	98.9	0.56		-1.00	-0.20	0.80		OR	1.99	[0.29, 13.70]	0.49	
Mean Cost PMPM, $		**492**	**438**	**0.09**	#	**525**	**397**	**<0.01**	*	**32**	**-40**	**0.02**	*	$	**74**	**[3, 145]**	**0.04**	*
(SD)		(630)	(446)	-----		(927)	(411)	-----		(670)	(361)	-----			-----	-----	-----	
Median Cost PMPM, $		297	298	-----		279	281	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-5,738)	(0-3,450)	-----		(0-11,305)	(0-3,405)	-----		-----	-----	-----			-----	-----	-----	
Narcotics																		
Any Cost, %		69	72	0.27		76	73	0.18		**7**	**1**	**0.03**	*	OR	**1.32**	**[0.96, 1.84]**	**0.09**	#
Mean Cost PMPM, $		27	20	0.27		27	20	0.35		-0.12	-0.37	-0.37	0.95	$	-1	[-10, 9]	0.90	
(SD)		(144)	(64)	-----		(178)	(71)	-----		(85)		(49)	-----		-----	-----	-----	
Median Cost PMPM, $		1.4	2	-----		1.7	1.8	-----		-----		-----	-----		-----	-----	-----	
(Range)		(0-2,330)	(0-865)	-----		(0-3,826)	(0-919)	-----		-----		-----	-----		-----	-----	-----	
Adult Family Home																		
Any Cost, %		**6**	**2**	**<0.01**	*	6	4	0.15		**0**	**2**	**0.07**	#		**0.59**	**[0.37, 0.93]**	**0.02**	*
Mean Cost PMPM, $		**77.07**	**36.35**	**0.03**	*	74.71	51.95	0.26		-2	16	0.11			-18	[-41, 6]	0.14	
(SD)		(372)	(251)	-----		(379)	(300)	-----		(204)	(171)							
Median Cost PMPM, $		0	0	-----		0	0	-----										
(Range)		(0-2,921)	(0-2,700)	-----		(0-4,287)	(0-3,359)	-----										
Adult Residential Care																		
Any Cost, %		0.90	0.36	0.25		0.53	0.36	0.66		**-0.37**	**0**	**0.10**	#		0.24	[-.04, 1.49]	0.13	
Mean Cost PMPM, $		7.21	2.90	0.39		3.11	4.56	0.70		-4	2	0.19			-7	[-17, 3]	0.18	
(SD)		(102.67)	(59.43)	-----		(51.84)	(70.97)	-----		(93)	(47)							
Median Cost PMPM, $		0	0	-----		0	0	-----										
(Range)		(0-2,140)	(0-1,389)	-----		(0-899)	(0-1,301)	-----										
Nursing Home Services																		
Any Cost, %		9	7	0.24		11	9	0.15		2	2	0.67			0.89	[0.54, 1.49]	0.67	
Mean Cost PMPM, $		194	181	0.80		248	190	0.29		54	8	0.17			48	[-20, 117]	0.17	
(SD)		(887)	(894)	-----		(852)	(984)	-----		(527)	(570)							
Median Cost PMPM, $		0	0	-----		0	0	-----										
(Range)		(0-6,237)	(0-6,259)	-----		(0-5,972)	(0-6,067)	-----										

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention.

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

[d]Outpatient Medical includes labs.

* Statistically significant at p<0.05.

Close to statistically significant (p>0.05 & ≤=0.10)

Intent-To-Treat Sample: Mental Health Care

		PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b,c]			
		RTC	Control	p	RTC	Control	p	RTC	Control	p				
	n	557	563		557	563		557	563			Est.	[95% CI][c]	p
Outpatient[d]														
Any Visit, %		**23**	**32**	**<0.01** *	**26**	**30**	**0.09** #	**3**	**-2**	**0.02** *	**OR**	**1.30**	**[1.07, 1.58]**	**<0.01** *
Mean Visits Per 100 MPM, n		68	79	0.32	**52**	**71**	**0.05** *	-16	-9	0.46	**n**	-4.63	[-22.54, 13.28]	0.61
(SD)		(200)	(180)	-----	(128)	(176)	-----	(165)	(157)	-----		-----	-----	-----
Median Visits Per 100 MPM, n		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-2,033)	(0-1,525)	-----	(0-1,110)	(0-2,212)	-----	-----	-----	-----		-----	-----	-----
Inpatient														
Community Inpatient Psychiatric														
Any Cost, %		6	7	0.51	9	8	0.71	3	1	0.84	**OR**	0.88	[0.50, 1.54]	0.65
Mean Cost PMPM[c], $		70	66	0.85	48	54	0.84	-23	-16	0.77	**$**	-18	[-65, 28]	0.44
(SD)		(396)	(333)	-----	(272)	(236)	-----	(411)	(394)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-5,259)	(0-4,990)	-----	(0-4,531)	(0-2,481)	-----	-----	-----	-----		-----	-----	-----
Mean Admissions Per 100 MPM, n		0.86	0.93	0.77	0.58	0.70	0.46	-0.2	-0.3	0.86	**n**	-0.19	[-0.64, 0.26]	0.41
(SD)		(4.4)	(3.8)	-----	(2.3)	(2.8)	-----	(4.1)	(3.3)	-----		-----	-----	-----
Median Admissions Per 100 MPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-66)	(0-38)	-----	(0-21)	(0-29)	-----	-----	-----	-----		-----	-----	-----
State Hospital														
Any Admission, %		1.4	0.9	0.39	2.0	1.6	0.64	0.6	0.7	0.83	**OR**	0.69	[0.20, 2.40]	0.56
Mean Cost PMPM[e],$		28	38	0.69	15	19		**-13**	**-19**	0.65	**$**	5.42	[-22.55, 33.38]	0.70
(SD)		(279)	(535)	-----	(145)	(252)	-----	(136)	(286)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0 - 4,800)	(0 -10,535)	-----	(0 - 2,400)	(0 -4,741)	-----	-----	-----	-----		-----	-----	-----
Mean Stay Per 100 MPM, Days		5.5	7.5	0.69	16.1	14.6	0.88	7.1	10.6	0.73	**n**	4.71	[-13.63, 21.32]	0.67
(SD)		(23)	(44)	-----	(172.7)	(155.2)	-----	(172)	(172)	-----		-----	-----	-----
Median Stay Per 100 MPM, Days		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-942)	(0-2,066)	-----	(0-3,108)	(0-2,164)	-----	-----	-----	-----		-----	-----	-----

		PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b,c]			
		RTC	Control	p	RTC	Control	p	RTC	Control	p				
	n	557	563		557	563		557	563			Est.	[95% CI][c]	p
Total Psychiatric Inpatient[f]														
Any Admission, %		7	8	0.61	9	10	0.65	**2**	**2**	0.99	**OR**	0.84	[0.50, 1.41]	0.52
Mean Cost PMPM, $		99	104	-----	63	69	0.73	**-36**	**-35**	0.98	**$**	-12.90	[-71.25, 45.45]	0.67
(SD)		(612)	(629)	-----	(331)	(346)	-----	(487)	(486)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0 - 10,059)	(0 - 10,535)		(0 - 4,531)	(0 - 4,741)	-----	-----	-----	-----		-----	-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Abbreviations: PMPM = per member per month; MPM = member per month

[d]Derived from Regional Service Network encounter data

[e]Estimated by assuming fixed costs of $509.77/day

[f]Total costs are estimated by summing community psychiatric inpatient costs and state hospital costs[e]

* Statistically significant at p<0.05.

[#]Close to statistically significant (p>0.05 & $\leq$=0.10)

Intent-To-Treat Analysis Sample: Alcohol Or Drug Treatment

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	RTC 557	Control 563	p	RTC 557	Control 563	p	RTC 557	Control 563	p	Est.	[95% CI]	p
Treatment Need, %	44.34	48.67	1.15	-----	-----	-----	-----	-----	-----	-----	-----	-----
Any Treatment (Inpatient, Outpatient, OS)												
Any Cost, %	23	23	0.92	23	24	0.59	0	1	0.43	0.92	[0.65, 1.30]	0.62
Mean Cost PMPM, $	54	63	0.32	50	46	0.55	-4	-17	0.08	**12.81**	**[-2.33, 27.96]**	**0.10** #
(SD)	(135)	(186)	-----	(129)	(116)	-----	-----	-----	-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----	-----	-----	-----	-----	-----
(Range)	(0 - 799)	(0 - 2082)	-----	(0 - 1,231)	(0 - 666)	-----	-----	-----	-----	-----	-----	-----
Inpatient Treatment												
Any Cost, %	4	4	0.90	6	4	0.32	2	0	0.35	1.54	[0.68, 3.50]	0.30
Mean Cost PMPM, $	8	19	0.10	8	5	0.21	0	-14	**0.04**	**11.01**	**[-1.05, 23.06]**	**0.07** #
(SD)	(56)	(138)	-----	(42)	(32)	-----	-----	-----	-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----	-----	-----	-----	-----	-----
(Range)	(0-629)	(0-1,937)	-----	(0-601)	(0-363)	-----	-----	-----	-----	-----	-----	-----
Outpatient Treatment												
Any Cost, %	14	14	0.81	13	14	0.53	-1	0	0.38	0.86	[0.55, 1.33]	0.49
Mean Cost PMPM, $	13	12	0.75	9	9	0.99	-4	-3	0.70	-1.48	[-6.64, 3.69]	0.58
(SD)	(52)	(47)	-----	(40)	(36)	-----	-----	-----	-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----	-----	-----	-----	-----	-----
(Range)	(0-633)	(0-648)	-----	(0-509)	(0-422)	-----	-----	-----	-----	-----	-----	-----
Opiate Substitution												
Any Cost, %	10	10	0.81	10	10	0.89	0	0	0.83	1.09	[0.86, 1.39]	0.47
Mean Cost PMPM, $	33	32	0.96	33	32	0.80	0	0	0.61	3.28	[-4.31, 10.88]	0.40
(SD)	(110)	(105)	-----	(108)	(107)	-----	-----	-----	-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----	-----	-----	-----	-----	-----
(Range)	(0-700)	(0-772)	-----	(0-761)	(0-666)	-----	-----	-----	-----	-----	-----	-----

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	RTC	Control	p	RTC	Control	p	RTC	Control	p			
	557	563		557	563		557	563		Est.	[95% CI]	p
Alcohol and Drug Related Detox												
Any Cost, %	5	4	0.64	5	5	0.86	0	0	1	0.44	1.01 [0.50, 2.01]	0.99
Mean Cost PMPM, $	4	3	0.96	3	3	0.94	-1	0	0	0.64	-0.16 [-2.78, 2.45]	0.91
(SD)	(23)	(20)	0.59	(17)	(16)	-----	-----		-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----		-----	-----	-----	-----
(Range)	(0-297)	(0-260)	-----	(0-220)	(0-193)	-----	-----		-----	-----	-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Abbreviations: PMPM = per member per month; CI=Confidence interval

[*]Statistically significant at p<.005.

[#]Close to statistically significant (p>0.05 & <=0.10)

Intent-To-Treat Sample: Other Outcomes

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	RTC	Control	p	RTC	Control	p	RTC	Control	p		Est.	[95% CI][c]	p
	557	563		557	563		557	563					
Criminal Arrests													
Any, %	13	11	0.37	13	14	0.65	0.0	3.0	0.22	OR[c]	0.81	[0.52, 1.28]	0.38
Mean Per 1,000 MPM[c], n	18	22	0.42	16	18	0.58	-2.0	-3.7	0.65	n	4.68	[-3.84, 13.19]	0.28
(SD)	(59)	(94)	-----	(57)	(72)	-----	(57.9)	(95.4)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-600)	(0-1,583)	-----	(0-579)	(0-1,000)	-----	-----	-----	-----		-----	-----	-----
Criminal Charges													
Any, %	13	11	0.37	13	14	0.65	0.0	3.0	0.22	OR	0.81	[0.52, 1.28]	0.37
Mean Per 1,000 MPM, n	33	32	0.92	27	30	0.71	-5.3	-2.0	0.58	n	1.55	[-14.22, 17.33]	0.85
(SD)	(121)	(162)	-----	(112)	(127)	-----	(117.5)	(163.8)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-1,700)	(0-2,750)	-----	(0-1,167)	(0-1,800)	-----	-----	-----	-----		-----	-----	-----
Felony or Gross Misdemeanor Charges													
Any, %	8	7	0.61	8.2	8.9	0.71	0.2	1.9	0.43	OR	0.84	[0.48, 1.46]	0.53
Mean Per 1,000 MPM, n	12	14	0.62	12.9	15.7	0.54	0.7	1.5	0.87	n	2.70	[-4.13, 9.51]	0.44
(SD)	(53)	(84)	-----	(14)	(85.3)	-----	(53.6)	(94.3)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-500)	(0-158)	-----	0(0-917)	0(0-1,000)	-----	-----	-----	-----		-----	-----	-----
Alcohol or Drug Arrests													
Any, %	5	4	0.35	3.8	3.7	0.97	-1.2	-0.3	0.42	OR	0.81	[0.37, 1.78]	0.61
Mean Per 1,000 MPM, n	5.9	5.7	0.95	4.7	6.3	0.56	-1.1	0.5	0.56	n	0.33	[-3.68, 4.34]	0.87
(SD)	(29)	(36)		(30.3)	(53.6)	-----	(32)	(58)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-300)	0(0-556)	-----	(0-391)	(0-1,000)	-----	-----	-----	-----		-----	-----	-----
Convictions													
Any, %	**8**	**11**	**0.09** *	8	7	0.24	**0.0**	**-4.0**	**0.01** *	OR	**1.95**	**[1.10, 3.44]**	**0.02** *
Mean Per 1,000 MPM, n	17	26	0.13	9	9	0.85	-8.0	-17.0	0.18	n	**8.90**	**[-1.5, 19]**	**0.09** #
(SD)	(72)	(103)	-----	(38)	(65)	-----	(72.6)	(110.4)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-667)	(0-1,333)	-----	(0-400)	(0-1000)	-----	-----	-----	-----		-----	-----	-----
Homeless Months													
Any, %	17	14	0.19	**11**	**16**	**0.02** *	-6.0	2.0	0.26	OR	0.84	[0.60, 1.17]	0.29
Mean Per 100 MPM, n	10.5	13.0	0.19	**10**	**16**	**0.09** #	-0.4	2.9	0.25	n	-1.50	[-4.3, 1.2]	0.29
(SD)	(30.3)	(32.6)	-----	(48)	(66)	-----	(42)	(54)	-----		-----	-----	-----
Median Per 100 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-200)	(0-171)	-----	(0-600)	(0-1,000)	-----	-----	-----	-----		-----	-----	-----

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	RTC 557	Control 563	p	RTC 557	Control 563	p	RTC 557	Control 563	p	Est.	[95% CI][c]	p
Death												
Any, %	-----	-----	-----	4.0	6.0	0.31						
Adjusted Odds Ratio [95% CI][a]	-----	-----	-----	**0.65 [0.59, 1.73]**		**0.10** #						
Time to Death (months)				10.5	11.6	0.64						

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post

[c]Abbreviations: MPM = member per month; OR = odds ratio; CI=Confidence interval

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & ≤=0.10)

APPENDIX C: FULL RESULTS FROM THE CARE PLAN DATE ANALYSIS

Care Plan Analysis Sample: Medical Costs And Service Use

	n	PRE - PERIOD RTC 251	PRE - PERIOD Control 251	p	POST - PERIOD RTC 251	POST - PERIOD Control 251	p		UNADJUSTED DIFFERENCE RTC 251	UNADJUSTED DIFFERENCE Control 251	p		ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b] Est.	[95% CI][c]	p	
Total Medicaid Medical																
Any Cost, %		100	100	1.00	100	99	0.16		0	-1	0.16	**OR**[c]	-----	-----	-----	
Mean Cost PMPM, $		1,818	1,864	0.83	1,954	2,007	0.84		136	143	0.97	**$**	-50	[-472, 371]	0.25	
(SD)		(2,093)	(2,672)	-----	(2,618)	(3,383)	-----		(2,259)	(2,764)	-----		-----	-----	-----	
Median Cost PMPM, $		1,074	1,145	-----	1,175	1,019	-----		-----	-----	-----		-----	-----	-----	
(Range)		(37-14,595)	(9-27,851)	-----	(42-19,753)	(0-31,492)	-----		-----	-----	-----		-----	-----	-----	
Emergency Room																
Any Cost, %		65	70	0.18	69	67	0.63		4	-3	0.13	**OR**	1.22	[0.73, 2.06]	0.45	
Mean Cost PMPM, $		107	100	0.74	113	89	0.21		6	-11	0.16	**$**	9	[-18, 36]	0.51	
(SD)		(251)	(184)	-----	(261)	(155)	-----		(149)	(133)	-----		-----	-----	-----	
Median Cost PMPM, $		29	34	-----	33	32	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0-2,392)	(0-1,475)	-----	(0-2,656)	(0-1,185)	-----		-----	-----	-----		-----	-----	-----	
Mean Visits Per 100 MPM, n		31	27	0.47	30	25	0.35		-1	-2	0.66	**n**	-0.80	[-7.6, 5.9]	0.81	
(SD)		(77)	(44)	-----	(78)	(45)	-----		(38)	(30)	-----		-----	-----	-----	
Median Visits Per 100 MPM, n		8.3	8.3	-----	8.3	9.5	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0-817)	(0-325)	-----	(0-855)	(0-338)	-----		-----	-----	-----		-----	-----	-----	
Oupatient Medical[d]																
Any Cost, %		100	99	0.16	**100**	**98**	**0.03**	**	0	-1	0.26	**OR**	-----	-----	-----	
Mean Cost PMPM, $		420	419	0.99	440	367	0.36		20	-52	0.18	**$**	**94**	**[-19, 206]**	**0.10**	#
(SD)		(751)	(614)	-----	(1,158)	(479)	-----		(638)	(551)	-----		-----	-----	-----	
Median Cost PMPM, $		282	252	-----	286	229	-----		-----	-----	-----					
(Range)		(4-9,307)	(0-5,614)		(3-17,309)	(0-4,061)	-----		-----	-----	-----					
Mean Visits PMPM, n		4.5	4.6	0.69	4.6	4.6	0.97		0.1	0	0.69	**n**	0.09	[-0.50, 0.69]	0.75	
(SD)		(3.6)	(4.1)	-----	(3.8)	(4.8)	-----		(3.5)	(3.4)	-----		-----	-----	-----	
Median Visits PMPM, $		3.4	3.8	-----	3.5	3.2	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0 - 26)	(0 - 33)	-----	(1 - 23)	(0 - 38)	-----		-----	-----	-----		-----	-----	-----	
Inpatient Medical																
Any Cost, %		37	32	0.22	39	36	0.52		2	4	0.65	**OR**	0.74	[0.41, 1.34]	0.32	
Mean Cost PMPM, $		652	713	0.71	655	935	0.17		3	222	0.24	**$**	-279	[-620, 63]	0.11	
(SD)		(1,402)	(2,216)	-----	(1,539)	(2,819)	-----		(1,774)	(2,367)	-----		-----	-----	-----	
Median Cost PMPM, $		0	0	-----	0	0	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0-8,268)	(0-24,383)		(0-11,130)	(0-28,476)			-----	-----	-----		-----	-----	-----	
Mean Admissions Per 100 MPM, n		6.4	5.9	0.70	6.9	7.1	0.90		0.5	1.1	0.59		**-1.80**	**[-3.8, 2.4]**	**0.09**	#
(SD)		(11.8)	(14.3)	-----	(15.3)	(15.7)	-----		(13.5)	(12.4)	-----		-----	-----	-----	
Median Admissions Per 100 MPM, $		0	0	-----	0	0	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0-75)	(0-108)	-----	(0-105)	(0-100)	-----		-----	-----	-----		-----	-----	-----	

		PRE - PERIOD				POST - PERIOD				UNADJUSTED DIFFERENCE					ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
		RTC	Control	p		RTC	Control	p		RTC	Control	p			Est.	[95% CI][c]	p	
	n	251	251			251	251			251	251							
Inpatient Medical With No ER Visit																		
Any Cost, %		13	15	0.52		16	13	0.45		3	-2	0.28		OR	1.42	[0.67, 3.00]	0.36	
Mean Cost PMPM, $		189	206	0.79		200	178	0.77		11	-28	0.69		$	43	[-135, 220]	0.64	
(SD)		(698)	(748)	-----		(867)	(848)	-----		(1,074)	(1,124)	-----			-----	-----	-----	
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-6,672)	(0-6,523)	-----		(0-8,172)	(0-11,373)	-----		-----	-----	-----			-----	-----	-----	
Mean Admissions Per 100 MPM, n		1.5	1.5	0.89		1.7	1.1	0.25		0.2	-0.4	0.29		n	0.32	[-0.58, 1.2]	0.48	
(SD)		(4.1)	(3.9)	-----		(7.4)	(3.3)	-----		(8.1)	(4.9)	-----			-----	-----	-----	
Median Admissions Per 100 MPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-17)	(0-25)	-----		(0-100)	(0-18)	-----		-----	-----	-----			-----	-----	-----	
Inpatient Medical With ER Visit																		
Any Cost, %		**31**	**23**	**0.04**	*	32	31	0.77		1	8	0.15		OR	0.69	[0.43, 1.11]	0.13	
Mean Cost PMPM, $		463	508	0.76		**455**	**757**	**0.08**	#	**-8**	**249**	**0.07**	#	n	**-321**	**[-591, -52]**	**0.02**	*
(SD)		(1,109)	(1,988)	-----		(1,156)	(2,521)	-----		(1,273)	(1,856)	-----			-----	-----	-----	
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-7,838)	(0-23,181)	-----		(0-7,853)	(0-28,476)	-----		-----	-----	-----			-----	-----	-----	
Mean Admissions Per 100 MPM, n		5.0	4.5	0.62		5.2	5.9	0.52		0.2	1.4	0.18		n	**-2.10**	**[-3.8, -0.4]**	**0.02**	*
(SD)		(10)	(13)	-----		(13)	(14)	-----		(10)	(11)	-----			-----	-----	-----	
Median Admissions Per 100 MPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-75)	(0-100)	-----		(0-100)	(0-100)	-----		-----	-----	-----			-----	-----	-----	
In Home Support Services																		
Any Cost, %		**28**	**21**	**0.08**	#	**38**	**25**	**<0.01**	*	**10**	**4**	**<0.01**	*	OR	**1.46**	**[1.08, 1.97]**	**0.03**	*
Mean Cost PMPM, $		407	379	0.73		453	384	0.39		46	5	0.13		$	37	[-19, 93]	0.20	
(SD)		(831)	(1,026)	-----		(817)	(991)	-----		(325)	(280)	-----			-----	-----	-----	
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-4,959)	(0-9,597)	-----		(0-5,009)	(0-9,614)	-----		-----	-----	-----			-----	-----	-----	
Out of Home Long Term Care																		
Any Cost, %		10	9	0.65		10	10	1.00		0	1	0.58		OR	0.89	[0.54, 1.50]	0.65	
Mean Cost PMPM, $		128	194	0.30		185	225	0.59		57	31	0.48		$	52	[-32, 136]	0.22	
(SD)		(566)	(833)	-----		(760)	(894)	-----		(470)	(354)	-----						
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----						
(Range)		(0 - 5,709)	(0 - 5,704)	-----		(0 - 5,737)	(0 - 5,716)	-----		-----	-----	-----						
Total Long Term Care[e]																		
Any Cost, %		**37**	**28**	**0.04**	*	**45**	**31**	**<0.01**	*	**8**	**3**	**0.04**	*	OR	**1.36**	**[1.01, 1.83]**	**0.04**	*
Mean Cost PMPM, $		535	573	0.71		638	609	0.78		103	36	0.15		$	**89**	**[-14, 192]**	**0.09**	#
(SD)		(964)	(1,276)	-----		(1,049)	(1,307)	-----		(545)	(502)	-----			-----	-----	-----	
Median Cost PMPM, $		0	0	-----		0	0	-----		-----	-----	-----			-----	-----	-----	
(Range)		(0-5,709)	(0-9,597)	-----		(0-5,737)	(0-9,614)	-----		-----	-----	-----			-----	-----	-----	

		PRE - PERIOD			POST - PERIOD				UNADJUSTED DIFFERENCE				ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
		RTC	Control	p	RTC	Control	p		RTC	Control	p					
	n	251	251		251	251			251	251			Est.	[95% CI][c]	p	
Prescription Drugs																
Any Cost, %		100	100	1.00	100	99	0.16		0	-1	0.16	OR	-----	-----	-----	
Mean Cost PMPM, $		512	493	0.70	**619**	**449**	**0.03**	*	**107**	**-44**	**0.02**	* $	**148**	**[1, 296]**	**0.05**	*
(SD)		(633)	(457)	-----	(1,138)	(509)	-----		(957)	(446)	-----		-----	-----	-----	
Median Cost PMPM, $		318	374	-----	339	337	-----		-----	-----	-----		-----	-----	-----	
(Range)		(1-5,290)	(5-3,363)	-----	(0-12,556)	(0-4,108)	-----		-----	-----	-----		-----	-----	-----	
Narcotics																
Any Cost, %		74	76	0.54	78	72	0.15		**4**	**-4**	**0.04**	OR	**1.50**	**[0.94, 2.40]**	**0.09**	#
Mean Cost PMPM, $		30	24	0.55	24	24	0.97		-7	-1	0.20	$	-8	[-18, 3]	0.15	
(SD)		(138)	(85)	-----	(100)	(88)	-----		(43)	(57)	-----		-----	-----	-----	
Median Cost PMPM, $		1.7	2.7	-----	2.5	2.8	-----		-----	-----	-----		-----	-----	-----	
(Range)		(0-1,626)	(0-995)	-----	(0-1,288)	(0-794)	-----		-----	-----	-----		-----	-----	-----	

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention.

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

[d]Outpatient Medical includes lab

[e]Long Term Care is a sum of Aging and Disability Services Administration in-home services, assisted living, adult family home, adult residential care, and nursing home costs

* Statistically significant at p<0.05.

[#]Close to statistically significant (p>0.05 & ≤=0.10)

Care Plan Analysis Sample: Mental Health Care

		PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE				ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	n	RTC 251	Control 251	p	RTC 251	Control 251	p	RTC 251	Control 251	p		Est.	[95% CI][c]	p	
Outpatient[c,d]															
Any Visit, %		22	26	0.25	25	25	1.00	**3**	**-1**	**0.05**	**	**OR[c]**	**1.28**	**[0.97, 1.69]**	**0.08** #
Mean Visits Per 100 MPM[d], n		58	68	0.43	61	61	0.99	4	-6.5	0.26		**n**	8	[-9, 25]	0.35
(SD)		(143)	(229)	-----	(147)	(151)	-----	(87)	(114)				-----	-----	-----
Median Visits Per 100 MPM, n		0	0	-----	0	0	-----	-----	-----	-----			-----	-----	-----
(Range)		(0-992)	(0-883)	-----	(0-1,200)	(0-900)	-----	-----	-----	-----			-----	-----	-----
Inpatient[e]															
Community Inpatient Psychiatric															
Any Cost, %		**5**	**9**	**0.08** #	6	6	1.00	1	-3	0.12		**OR**	1.63	[0.63, 4.23]	0.32
Mean Cost PMPM[f], $		44	58	0.52	30	42	0.54	-14	-16	0.95		**$**	-10	[-67, 46]	0.72
(SD)		(243)	(231)	-----	(194)	(238)	-----	(306)	(319)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----			-----	-----	-----
(Range)		(0-2,206)	(0-1,926)	-----	(0-2,427)	(0-2,226)	-----	-----	-----	-----			-----	-----	-----
Mean Admissions Per 100 MPM, n		0.5	0.9	0.17	0.6	0.5	0.79	0.1	-0.4	0.24		**n**	0.19	[-0.39, 0.76]	0.53
(SD)		(2.6)	(3.3)	-----	(3.7)	(2.6)	-----	(4.4)	(3.9)	-----			-----	-----	-----
Median Admissions Per 100 MPM, $		0	0	-----	0	0	-----	-----	-----	-----			-----	-----	-----
(Range)		(0-25)	(0-33)	-----	(0-29)	(0-50)	-----	-----	-----	-----			-----	-----	-----
State Hospital															
Any Admission, %		1	1	1.00	0.4	2	0.18	-0.6	1	0.26		**OR**	0.24	[0.02, 2.90]	0.27
Mean Cost[e] PMPM, $		2	3	0.60	2	10	0.37	0	7	0.35		**$**	-0.57	[-2.54, 1.41]	0.57
(SD)		(19)	(30)	-----	(22)	(147)	-----	(4)	(122)	-----			-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	0	0	-----			-----	-----	-----
(Range)		(0-273)	(0-386)	-----	(0-327)	(0-2,315)	-----	(0-55)	(0-1,929)	-----			-----	-----	-----
Mean Stay Per 100 MPM, Days		4.2	6.6	0.64	0.5	19	0.15	-3.7	12.8	0.12			-5	[-13, 2]	0.17
(SD)		(45)	(67)	-----	(7.8)	(205)	-----	(46)	(161)	-----			-----	-----	-----
Median Stay Per 100 MPM, Days		0	0	-----	0	0	-----	-----	-----	-----			-----	-----	-----
(Range)		(0-641)	(0-908)	-----	(0-123)	(0-2,850)	-----	-----	-----	-----			-----	-----	-----

		PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	n	RTC 251	Control 251	p	RTC 251	Control 251	p	RTC 251	Control 251	p		Est.	[95% CI][c]	p
Total Psychiatric Inpatient[g]														
Any Admission, %		**6**	**10**	**0.07** #	7	7	1.00	**1**	**-3**	**0.09** #	**OR**	1.60	[0.69, 3.71]	0.27
Mean Cost[e] Per 100 MPM, $		5	8	0.45	6	14	0.44	1	6	0.52	**$**	-1.50	[-6.16, 3.16]	0.53
(SD)		(34)	(35)	-----	(50)	(148)	-----	(49)	(125)	-----		-----	-----	-----
Median Cost PMPM, $		0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)		(0-456)	(0-386)	-----	(0-704)	(0-2,315)	-----	-----	-----	-----		-----	-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Derived from Regional Service Network encounter data

[d] MPM = member per month

[e]Estimated by assuming fixed costs of $509.77/day

[f] PMPM = per member per month

[g]Total costs are estimated by summing community psychiatric inpatient costs and state hospital costs

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & ≤=0.10)

Care Plan Analysis Sample: Alcohol Or Drug Treatment

	PRE - PERIOD			POST - PERIOD				UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	RTC 251	Control 251	p	RTC 251	Control 251	p		RTC 251	Control 251	p	Est.	[95% CI][c]	p	
Treatment Need, %	43	44	0.79	-----	-----	-----		-----	-----	-----	-----	-----	-----	
Any Treatment (Inpatient, Outpatient, OS)														
Any Cost, %	22	21	0.75	21	18	0.37		-1	-3	0.42	1.31	[0.79, 2.06]	0.31	
Mean Cost PMPM[c], $	52	47	0.65	**57**	**34**	**0.04**		**5**	**-13**	**0.02**	**14.7**	**[1.37, 28.04]**	**0.03**	*
(SD)	(133)	(130)	-----	(137)	(99)	-----		-----	-----	-----	-----	-----	-----	
Median Cost PMPM, $	0	0	-----	0	0	-----		-----	-----	-----	-----	-----	-----	
(Range)	0 - 703	0 - 1,115	-----	0 - 799	0 - 639	-----		-----	-----	-----	-----	-----	-----	
Inpatient Treatment														
Any Cost, %	2	2	0.74	4	2	0.13		2	0	0.25	1.91	[0.37, 9.83]	0.44	
Mean Cost PMPM, $	4	5	0.85	**6**	**2**	**0.04**	*	2	-3	0.26	3.81	[-4.15, 11.77]	0.35	
(SD)	(35)	(60)	-----	(32.99)	(13.21)	-----		-----	-----	-----	-----	-----	-----	
Median Cost PMPM, $	0	0	-----	0	0	-----		-----	-----	-----	-----	-----	-----	
(Range)	(0-406)	(0-911)	-----	(0-342)	(0-152)	-----		-----	-----	-----	-----	-----	-----	
Outpatient Treatment														
Any Cost, %	14	13	0.69	11	12	0.56		-3	-1	0.87	1.11	[0.46, 2.02]	0.74	
Mean Cost PMPM, $	14	12	0.78	11	7	0.34		-3	-5	0.61	2.10	[-6.7, 10.99]	0.64	
(SD)	(67)	(56)	-----	(55)	(85)	-----		-----	-----	-----	-----	-----	-----	
Median Cost PMPM, $	0	0	-----	0	0	-----		-----	-----	-----	-----	-----	-----	
(Range)	(0 - 696)	(0 - 657)	-----	(0 - 465)	(0 - 439)	-----		-----	-----	-----	-----	-----	-----	
Opiate Substitution														
Any Cost, %	10	10	0.88	11	9	0.46		1	-1	0.11	**1.45**	**[0.94, 2.24]**	**0.09**	#
Mean Cost PMPM, $	34	29	0.61	40	26	0.15		**6**	**-3**	**0.04**	**8.79**	**[-0.34,17.93]**	**0.06**	#
(SD)	(109)	(96)	-----	(93)	(121)	-----		-----	-----	-----	-----	-----	-----	
Median Cost PMPM, $	0	0	-----	0	0	-----		-----	-----	-----	-----	-----	-----	
(Range)	(0 - 703)	(0 - 406)	-----	(0 - 799)	(0 - 637)	-----		-----	-----	-----	-----	-----	-----	

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	RTC 251	Control 251	p	RTC 251	Control 251	p	RTC 251	Control 251	p	Est.	[95% CI][c]	p
Alcohol and Drug Related Detox												
Any Cost, %	3	2	0.56	3	2	0.56	0	0	1.00	0.91	[0.20, 4.11]	0.91
Mean Cost PMPM, $	3	7	0.49	1	1	0.42	-2	-6	0.42	4.38	[-6.35, 15.10]	0.42
(SD)	(30)	(76)	-----	(10)	(6)	-----	-----	-----	-----	-----	-----	-----
Median Cost PMPM, $	0	0	-----	0	0	-----	-----	-----	-----	-----	-----	-----
(Range)	(0 - 440)	(0 - 1,151)	-----	(0 - 111)	(0 - 74)	-----	-----	-----	-----	-----	-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.associated with the intervention.

[c]Abbreviations: PMPM = per member per month; CI=Confidence interval

*Statistically significant at p<0.05.

#Close to statistically significant (p>0.05 & <=0.10)

Care Plan Analysis Sample: Other Outcomes

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]			
	RTC	Control	p	RTC	Control	p	RTC	Control	p				
	n = 251	n = 251		n = 251	n = 251		n = 251	n = 251			Est.	[95% CI]	p
Criminal Arrests													
Any, %	7	8	0.74	8	10	0.54	1.0	2.0	0.79	**OR**[c]	0.70	[0.28, 1.71]	0.43
Mean Per 1,000 MPM, n	8	8	0.82	9	8	0.80	1.0	0.0	0.65	**n**	0.27	[-6.4, -6.9]	0.94
(SD)	(31)	(34)	-----	(34)	(29)	-----	(39)	(29)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-417)	(0-250)	-----	(0-308)	(0-278)	-----	-----	-----	-----		-----	-----	-----
Criminal Charges													
Any, %	7	8	0.74	8	10	0.54	1.0	2.0	0.79	**OR**	0.70	[0.28, 1.71]	0.43
Mean Per 1,000 MPM, n	11	12	0.76	13	12	0.82	2.2	-0.2	0.58	**n**	-0.3	[-10.1, -9.4]	0.95
(SD)	(52)	(46)	-----	(57)	(51)	-----	(42)	(57)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-583)	(0-333)	-----	(0-467)	(0-476)	-----	-----	-----	-----		-----	-----	-----
Felony or Gross Misdemeanor Charges													
Any, %	5	5	0.84	6	6	0.85	1.0	1.0	0.74	**OR**	0.64	[0.21, 1.94]	0.43
Mean Per 1,000 MPM, n	6	5	0.59	7	5	0.59	0.6	0.3	0.91	**n**	-0.7	[-6.2, 4.7]	0.79
(SD)	(31)	(24)	-----	(39)	(28)	-----	(30)	(31)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-333)	(0-167)	-----	(0-467)	(0-286)	-----	-----	-----	-----		-----	-----	-----
Alcohol or Drug Arrests													
Any, %	1	1	1.00	2	2	1.00	1.0	1.0	1.00	**OR**	0.85	[0.14, 5.24]	0.86
Mean Per 1,000 MPM, n	0.9	1.7	0.56	1.6	1.7	0.92	0.6	0.0	0.70	**n**	0.3	[-2.4, 3.0]	0.81
(SD)	(9)	(16)		(14)	(18)	-----	(15)	(15)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-83)	0(0-167)	-----	0(0-182)	0(0-278)	-----	-----	-----	-----		-----	-----	-----
Convictions													
Any, %	8	8	1.00	2	3	0.78	-6.0	-5.0	0.88	**OR**	0.80	[0.21, 3.02]	0.74
Mean Per 1,000 MPM, n	11	10	0.86	2	2	0.95	-8.2	-8.7	0.88	**n**	1.6	[-6.0, 9.1]	0.69
(SD)	(39)	(45)	-----	(16)	(14)	-----	(41)	(42)	-----		-----	-----	-----
Median Per 1,000 MPM, n	0	0	0	0	0	0.95	-----	-----	-----		-----	-----	-----
(Range)	(0-333)	(0-250)	-----	(0-208)	(0-125)	-----	-----	-----	-----		-----	-----	-----
Homeless Months													
Any, %	10	11	0.89	**8**	**13**	**0.06** #	**-2.0**	**2.0**	**0.04** *	**OR**	**0.45**	**[0.25, 0.81]**	**<0.01** *
Mean Per 100 MPM, n	7	8	0.59	4	6	0.20	-3.0	-2.0	0.45	**n**	-2.0	[-5.1, 1.2]	0.22
(SD)	(23)	(24)	-----	(18)	(20)	-----	(13)	(18)	-----		-----	-----	-----
Median Per 100 MPM, n	0	0	-----	0	0	-----	-----	-----	-----		-----	-----	-----
(Range)	(0-100)	(0-100)	-----	(0-100)	(0-100)	-----	-----	-----	-----		-----	-----	-----

	PRE - PERIOD			POST - PERIOD			UNADJUSTED DIFFERENCE			ADJUSTED DIFFERENCE-IN-DIFFERENCE[a,b]		
	RTC	Control	p	RTC	Control	p	RTC	Control	p			
	n = 251	n = 251		n = 251	n = 251		n = 251	n = 251		Est.	[95% CI]	p
Death												
Any, %	-----	-----	-----	4.0	6.0	0.31						
Adjusted Odds Ratio [95% CI][a]	-----	-----	-----	0.37 [0.13, 1.02]		0.06 [#]						
Time to death (months)				10	6	0.30						

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All models included indicators of group assignment, time (pre=1; post=0) and group x time interaction. All were adjusted for risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the post period.

[c]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

*Statistically significant at p<0.05.

[#]Close to statistically significant (p>0.05 & <=0.10)

APPENDIX D: SELECT ITEMS FROM THE KCCP NURSING ASSESSMENT INTERVIEW

Unless otherwise noted items below came from the KCCP nursing assessment interview.

Living Situation:

1. Who lives with you?
   ☐ Alone ☐ Spouse/Partner ☐ Daughter/Son ☐ Grandchildren
   ☐ Parents ☐ Friends

2. Are you concerned about your housing situation?
   ☐ Yes ☐ No

3. Do you have dependable transportation for medical appointments or other activities?
   ☐ Yes ☐ No

4. Is there someone you can count on to help if you need it?
   ☐ Yes ☐ No

Trauma:

1. Are you afraid of your partner, a family member, friend, or roommate?
   ☐ Yes ☐ No

2. Has he/she ever put you down, said hurtful things, or threatened you?
   ☐ Yes ☐ No

3. Has he/she ever threatened or forced you to have sexual contact?
   ☐ Yes ☐ No

Alcohol/Drugs:

1. How often have you had a drink containing alcohol in the last year? Consider a "drink" to be a can or bottle of beer, a glass of wine, a wine cooler, or one cocktail or shot of hard liquor (like scotch, gin, vodka).
   ☐ Never ☐ Monthly or less ☐ 2-4x/mo ☐ 2-3x/wk ☐ >4 days/wk

2. How many drinks containing alcohol did you have on a typical day when you were drinking in the last year?
   ☐ I do not drink ☐ 1-2 drinks a day ☐ 3-4 drinks ☐ 5-6 drinks ☐ 7-9 drinks ☐ 10 or more

3. How often in the last year have you had 6 or more drinks on one occasion?
   ☐ Never ☐ Less than monthly ☐ Monthly ☐ Weekly ☐ Daily

4. Are you presently using any street or illegal drugs, misusing prescribed medications, glue, or inhalants?
   ☐ Yes ☐ No

Tobacco Use:

1. Do you use tobacco now?
   ☐ Yes ☐ No

2. If yes, how much do you smoke per day? Pack quantity _____

Mental Health:

Need for alcohol and drug treatment as well as mental health diagnosis indicators for psychosis, bipolar/mania, neurosis, and depression were taken from the CODB.

Physical Health:

Body Mass Index (BMI): Calculated from patient's height and weight via: weight (in kg)/height (m^2)

Problems with Activities of Daily Living (ADL)

Note: Summarized as a single score in analyses.

I would like to ask you about some activities of daily living, things that we need to do part of our daily lives. I would like to know if you can do these activities without any help at all, with some help, or if you can't do them at all.

1. Can you use the telephone?
   ☐ Without help ☐ With some help ☐ Unable

2. Can you get to places out of walking distances?
   ☐ Without help ☐ With some help ☐ Unable

3. Can you go shopping for groceries or clothes (assuming transportation)?
   ☐ Without help ☐ With some help ☐ Unable

4. Can you prepare your own meals?
   ☐ Without help ☐ With some help ☐ Unable

5. Can you do your housework?
   ☐ Without help ☐ With some help ☐ Unable

6. Can you take your own medicine?
   ☐ Without help ☐ With some help ☐ Unable

7. Can you handle your own money?
   ☐ Without help ☐ With some help ☐ Unable

Total Risk Score: A summary score that estimates risk of future health care costs 50% or higher (risk score of 1.5 or higher) than the average Medicaid SSI client using data from the CODB.

APPENDIX E: PRIOR EVALUATIONS OF THE KING COUNTY CARE PARTNERS (KCCP)-RETHINKING CARE (RTC) PROGRAM

The King County Care Partners (KCCP) Pilot Program was initiated in April 2007 to provide chronic care management for Medicaid fee-for-service adult patients. It was funded by the Health and Recovery Services Administration (HRSA) of the Washington State Department of Social and Health Services (now known as the Health Care Authority (HCA)). The focus was on individuals who were eligible for Aged, Blind, Disabled categorically needy Medicaid benefits, who were not covered by similar insurance, and who had received services at one of KCCP's partnering clinics. An additional criterion was that clients could not be receiving long-term care services from the Aging and Disability Services Administration. Of clients meeting these criteria, the top 20% who were at risk of having future high medical expenses were selected for the pilot, a total of 1,701 clients. Approximately half (839) were randomly assigned to a group offered immediate treatment and the other half (862) to a group not offered treatment for a year (referred to as the abeyance group). Nurse care managers provided care management, education, assistance, and coordination of medical services to patients assigned to the treatment group. In general, goals of the program were to improve health outcomes, prevent avoidable medical costs, and support medical home development for Medicaid clients.

In 2008, an evaluation of the program was conducted, comparing outcomes of clients randomly assigned to the intervention with those assigned to an 'abeyance' group over the first 9 months of the program. Results indicated that of the 839 individuals offered treatment, only 18% engaged. There were no medical cost savings relative to the abeyance group. However, those in the treatment group experienced significantly lower mortality in the post intervention period than those in the abeyance group (0.8% versus 2.2%, respectively, p=0.03)[1] which continued to be significant at 12 months[2].

Focus on the Intervention and the Intervention Team

In 2009, the state HRSA funded an enhanced and expanded version KCCP Pilot which became the KCCP-RTC Program, the subject of the present evaluation. Within a year of RTC Program initiation, a series of studies was undertaken to learn more about the project as it was being implemented. The initial study was a content analysis of narrative chart notes contained in the project's client contact data base with the intent of understanding more about the contacts between nurse care managers and clients.[3] In essence, analyses revealed that the nurse care managers routinely addressed and navigated complex constellations of medical, mental health, and psychosocial issues as well as organizations and systems with RTC clients. A subsequent study expanded on this information through a series of key informant interviews with RTC administrators; nurse care managers and social workers employed by the program; and physicians and clinic care coordinators in partner community health centers.[4] One key informant (an RTC administrator) stated, "The intervention is communicating with every player in a very complex system… so that each knows what the other is doing and trying to align care plans".

[1] Health and Recovery Services Administration (October 14, 2008). *King County Care Partners Chronic Care Management Project. Savings/Cost Analysis.* Olympia, WA: Washington State Department of Social and Health Services.

[2] Beverly Court, Personal communication, February 7, 2012. Olympia, WA: Research and Data Analysis Division, Washington State Department of Social and Health Services.

[3] Krupski, T., Cristofalo, M., Atkins, D., Joesch, J. M., & Roy-Byrne, P. (September 15, 2009). *Quantitative and Qualitative Analyses of Client Contacts that Occurred during the First Three Months of the Rethinking Care Project.* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

[4] Cristofalo, M., Krupski, T., Jenkins, L., Yee, A., Atkins, D., West, I., & Roy-Byrne, P. (June 29, 2010). *Chronic Care Management Intervention: A Qualitative Analysis of Key Informant Accounts.* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

Key informants described clients' gaining confidence, skills, and resources to navigate the health care system and self-manage their health as a primary goal of the intervention. A social worker with the program gave an example of a successful manifestation of this goal: "And pretty much when the visits that I have participated in with clients, pretty much they take the lead. They do the talking. I just kind of like step back…because they are activated and that's, that's just a wondering (sic) thing to see. You know, that this is your thing and you're going to be your own advocate."

In their own words, key informants also described a number of challenges including cross-institutional information sharing, homelessness as a challenge to clients' participation in the program, and issues with providers. With respect to the latter, an RTC Administrator stated: "Our clients...are some of the most complex, difficult, people to work with and you have to have…your best trained physicians…to work with this group. You can't just take the least skilled people like your brand new resident doctor and say, 'deal with this person who's got five diseases, pancreatic cancer, whatever else.'" A social worker with the program made another point related to providers: "…right now if you were to call…and try to get an appointment as a new client in the…Clinic, you're going to have an appointment four to six months from now…and with somebody with chronic health conditions, you know, congestive heart failure, hypertension, diabetes, they don't need to wait four to six months to get…into a doctor and get…connected." Finally, key informants discussed system challenges such as a lack of chemical dependency and mental health treatment.

Client Perspectives

Complementing these studies focused on the intervention team was a telephone survey conducted with 286 (or 70%) of the first 406 clients randomized to the intervention.[5] The survey took place just over a year after randomization began. Approximately 42% of survey respondents were participants in the RTC Program and had completed a care plan; 12% had agreed to participate in RTC but had not completed a care plan; 13% had refused to participate in RTC; and 34% said they had never heard about the program.

All 286 respondents were given the EQ-5D[6] to assess their health status. Results suggest that over three-quarters of them were facing serious health challenges. For example, almost 87% indicated they were in moderate or extreme pain/discomfort; 79% had some problems with or were unable to perform usual activities; 76% indicated they were moderately or extremely anxious or depressed; 73% indicated having some problems with walking about while 56% reported no problems with self-care. Despite these health challenges, 91% of clients who had completed a care plan with their nurse care manager indicated that RTC program helped them feel they could take charge of their health; 92% indicated that the healthcare goals established in the RTC Program included their most important needs; and 90% were able to reach at least one healthcare goal. Although the RTC Program had only been underway for one year when this survey was conducted, these responses suggested that the program goals were being achieved, at least with the subset of clients who had completed a care plan. These clients also reported high regard for RTC nurses and social workers with 98% reporting a "good, trusting relationship with their nurse/social worker", 93% indicating they found it easy to reach their nurse/social worker; and 91% responding that their nurse/social worker understood their culture. These clients also reported

[5] Krupski, T., Cristofalo, M., Jenkins, L., Atkins, D., Joesch, J.M., West, I. I., and Roy-Byrne, P. (June 30, 2010). *Client Perspectives on the Rethinking Care Program: Report of a Telephone Survey.* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

[6] http://www.euroqol.org/eq-5d/what-is-eq-5d.html, Accessed 2/8/12.

being satisfied with the RTC Program[7] with 95% indicated they would recommend RTC to a friend in need of similar help and 83% indicating that services received helped them deal more effectively with their problems.

Over 90% of clients who agreed to participate in RTC had a personal doctor. Yet, when asked if they always got an appointment as soon as needed, about 65% of those with a care plan said they did while only 41% of those without a care plan said they did ($p<0.03$). These results suggest that one of the benefits of RTC Program participation may be a higher likelihood of getting a doctor's appointment when needed.

Exploration of Subgroups

Although clients enrolled in the RTC Program share important characteristics, clinical anecdotes as well as previous research suggested there might be distinct subsets of clients. A cluster analysis based on information collected during assessment was conducted to explore this question.[8] Results of the cluster analysis revealed two distinct subgroups of clients. One group was younger, reported significant alcohol/drug use, significant abuse history, isolated living situation, and significant mental health problems. In contrast, a second group was more likely to be married, report having social support, report few alcohol/drug problems, but more likely to report physical health problems that interfered with their daily functioning. Broadly, these results described a set of clients with primarily addiction/mental health problems and a second with primarily physical health problems. At the time this analysis was done, we wondered whether these client groups may relate to outcomes, especially health care utilization and costs and suggested it as a topic for future study.

Differences between Clients Who Started an Assessment and Those Who Did Not

Using information from the Client Outcomes Database[9] and the KCCP database, an analysis was conducted on 392 RTC clients who were randomized to the RTC intervention in February and March 2009 to examine how clients who started an assessment differed from those who did not.[10] According to KCCP assessment data, 58% of the 392 clients began an assessment and 42% did not. The analysis showed that assessed clients were more likely to receive home-based services from the Aging and Disability Services Administration (ADSA), to be female, and to receive medications for insomnia. In addition, they were less likely to receive medications for infections. Clients receiving home-based services from ADSA may have been more likely to start an assessment because they were already closely tied to a system of services and possibly more open to another service.

[7] Client satisfaction was measured with the CSQ-8. See Attkisson, C.C., & Greenfield, T.K. (2004). The UCSF Client Satisfaction Scales: I. The Client Satisfaction Questionnaire-8. In M. Maruish (Ed.), *The use of psychological testing for treatment planning andoutcome assessment* (3rd. Ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

[8] Atkins, D., West, I.I., Krupski, T., Cristofalo, M., and Roy-Byrne, P. (June 28, 2010). *Are There Distinct Subgroups of Rethinking Care Clients? A Cluster Analysis of Assessment Data*. Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

[9] Kohlenberg, L. (2009). *Integrated client database. Data that improves DSHS decision making and services*. Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division. Report No. 11.144.

[10] West, I. I., Joesch, J. M., Atkins, D., Krupski, T., Cristofalo, M., Jenkins, L., & Roy-Byrne, P. (June 30, 2010). *Clients Assigned to the Rethinking Care Program Intervention: How Do Clients Who Started an Assessment Differ from Those Who Did Not?* Seattle, WA: Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP), Department of Psychiatry and Behavioral Sciences, University of Washington at Harborview Medical Center.

Summary

Taken together, the results of these early studies create a context for the final quantitative evaluation of the Washington State King County Care Partners-Rethinking Care Program. Results of these studies helped us understand the program and the clients it served. As such, they were an important influence in the design of the final evaluation as well as in the interpretation of results.