

## Final Report

# The Impact of the Assertive Community Treatment Program on Health Care Costs, Quality, and Member Experience

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## Executive Summary

NORC at the University of Chicago is pleased to present findings from an evaluation of the Assertive Community Treatment (ACT) program. The ACT program serves individuals with serious mental illness (SMI) enrolled in the Mercy Maricopa Integrated Care (Mercy Maricopa) Medicaid managed care plan in Maricopa and parts of Pinal County, Arizona. Mercy Maricopa is a local not-for-profit health plan sponsored by Mercy Care Plan (MCP) and Maricopa Integrated Health Systems, and is administered by Aetna. In March 2013, Mercy Maricopa was awarded the Regional Behavioral Health Authority (RBHA) contract for Maricopa County by the Arizona Department of Health Services (ADHS), now managed by the Arizona Health Care Cost Containment System (AHCCCS), Arizona's Medicaid agency.

We conducted a mixed-methods evaluation using data on health care costs and utilization provided by Mercy Maricopa, and a series of semi-structured interviews with service providers, member advocates and other stakeholders. This report describes the ACT program and presents findings on 1) the characteristics of members served by the ACT program, 2) the overall health care experience of members served by ACT, 3) the impact of the program on cost of care, and 4) the impact of the program on utilization-based quality measures for ACT program members.

To provide a descriptive overview of the program, we analyzed differences in cost and quality of care before and after enrollment in ACT for members served by the program. To determine program impact, we compared change in health care experience of members enrolled in ACT to that of a comparison group of Mercy Maricopa members, matched to the treatment group using propensity score methods. Members in both groups all had a diagnosis of SMI. Matching variables included demographic characteristics and illness burden - measured using the Chronic Illness & Disability Payment System (CDPS) algorithm, a diagnosis and pharmacy based risk adjustment model score.<sup>1</sup> We acknowledge limitations in our ability to match all of the relevant characteristics of the treatment population within the comparison group given the available data. However, despite these limitations, use of a matched comparison group in observational research is an effective technique that can help attribute changes in outcomes to a specific program, as opposed to other factors.

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<sup>1</sup> The Chronic Illness and Disability Payment System (CDPS) – a diagnosis and pharmacy based risk adjustment model – was used to account for differences in illness burden across the treatment and comparison groups. The CDPS risk score factors in an individual's age, gender, cumulative diagnoses, and cumulative disease severity to create a value used for risk adjustment, a higher score from zero denotes a higher burden of disease.

## What is the Assertive Community Treatment program?

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ACT program teams consist of ten or more interdisciplinary professional health workers, including psychiatric nurses, social workers, substance abuse specialists, vocational rehabilitation specialists, housing specialists, employment specialists, and peer specialists. ACT teams provide a full-range of services—including employment and housing—to people diagnosed with SMI, and are available to members 24 hours a day, seven days a week for an unlimited number of years. ACT teams provide services ranging from helping members find suitable housing to providing daily reminders for members to take their medications or keep appointments. ACT is the highest level of care and support offered by Mercy Maricopa for their members with SMI; the ACT team is expected to meet with participating members in person up to four times a week, depending on their level of clinical need. Mercy Maricopa supports 24 ACT teams across Maricopa County.

In order to determine eligibility for ACT teams, providers develop an internal protocol to screen members with SMI in their clinics to determine whether those members qualify for an ACT team. Members are also referred by Level 1 hospitals for ACT screenings. Criteria include: pattern of frequent hospital admissions, frequent use of emergency services, discharges from long-term hospitalizations, co-occurring substance use disorders, homelessness, involvement with the criminal justice system, not adhering to medications as prescribed, and not benefitting from traditional mental health services.<sup>2</sup>

## Who does the Assertive Community Treatment program serve?

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The 834 ACT program members included in our analysis were eligible for Medicaid for an average of 13 cumulative months prior to enrollment in the program. The majority of members in the ACT program were male (57%). Compared to members in the supported employment intervention, ACT enrollees have a higher average Chronic Illness and Disability Payment System (CDPS) risk score, which is a diagnosis and pharmacy based risk adjustment model score, denoting a high burden of disease among this group.

## How does the Assertive Community Treatment program work?

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**The ACT program works to increase access to health care and supportive services.** Mercy Maricopa enrolls members diagnosed with SMI and at high risk of experiencing a mental health crisis or hospitalization into the ACT program. ACT teams provide services that wrap-around normal clinical care to foster member access to care, treatment, housing, employment, and other support, as needed.

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<sup>2</sup> More information about admissions criteria can be found here:  
<https://www.mercymaricopa.org/assets/pdf/providers/manuals/ACT-Operational-Manual-20170622.pdf>

Stakeholders agreed that the ACT program has increased members' access to necessary services. Mercy Maricopa has expanded ACT enrollment spots to an additional 900 members. By expanding the program, Mercy Maricopa hopes to ensure more individuals with higher needs receive the care and support required to achieve stabilization and long-term success.

**Mercy Maricopa provides member-centered care through its ACT program.** Mercy Maricopa staff and outside stakeholders describe the ACT program, and Mercy Maricopa's overall approach to care, as "member-centric." The organization's strategies, informed by the SAMHSA Fidelity model, focus on ensuring that members have full agency to obtain and direct their services and supports.<sup>3</sup> With the implementation and expansion of the Fidelity model, both in response to the legal settlement and as an extension of Mercy Maricopa's member-oriented approach to health care, providers reoriented their focus from provider-directed care to that of member-directed goals.<sup>4</sup>

### How does the Assertive Community Treatment program affect health care costs?

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In at least one quarter prior to their enrollment in the intervention, members served by ACT incurred average health care costs of \$16,000 per member per quarter. This average is higher than members using other services (for example, supported employment) and is likely due to the high-acuity of individuals enrolled in the ACT program.

**Members enrolled in ACT experienced reductions in costs associated with behavioral health services after enrolling in the program.** Among members enrolled in ACT (the "treatment group"), we found statistically significant differences in behavioral health costs, including a six percent relative decrease in per member per quarter cost of professional services associated with behavioral health, and an 11 percent relative decrease in behavioral health facility costs. We also found a reduction in overall total cost of care. While this reduction was not statistically significant<sup>5</sup>, it may signal a promising trend. Finally, we found a reduction in overall inpatient facility costs, although this result is not statistically significant. In a sign that the program may be improving the use of medication to address the health needs

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<sup>3</sup> Mercy Maricopa adheres to the Substance Abuse and Mental Health Services Administration (SAMHSA) Fidelity models for their programs. SAMHSA defines fidelity as "the degree to which a program is implemented as its developer intended. If a program closely adheres to the original strategy, it's more likely to replicate the positive outcomes of the program's initial implementation or testing." See <https://www.samhsa.gov/capt/applying-strategic-prevention-framework/step5-evaluation/process-outcomes-evaluation>

<sup>4</sup> Under a judgment reached in 1986 and affirmed by the State Supreme Court in 1991, the state was required to provide a combination of supportive housing, supported employment, Assertive Community Treatment, and peer and family services to individuals with SMI in Maricopa County. In January 2014, the parties reached a settlement to the lawsuit, which included specific requirements to increase the number of individuals served by the employment, housing, assertive community treatment, and peer support services and to implement ongoing evaluation tools in line with the SAMHSA Fidelity Model.

<sup>5</sup> Statistical significance was assessed at  $p < 0.10$

of ACT members, our results showed a significant relative increase in pharmacy costs of approximately 13 percent per member per quarter.

**Relative to a comparison group, members enrolled in ACT experienced promising reductions in cost in certain categories.** When we added a comparison group, we did not see any statistically significant differences in costs before and after ACT enrollment between the treatment and comparison groups. However, we did see a number of promising trends. Both members enrolled in ACT and members assigned to a matched comparison group experienced lower costs of care after program implementation. The decrease in cost was only marginally greater for the members receiving ACT services (a reduction of \$734 per member per quarter) relative to the comparison group (a reduction of \$548 per member per quarter). We also found a greater decrease in costs for ACT members relative to the comparison group for some sub-categories of costs. For example, ACT members experienced a decrease of \$801 per member per quarter in the cost of behavioral health relative to the comparison group (\$628).

### How does the Assertive Community Treatment program affect utilization-based measures of quality?

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**Members enrolled in ACT experienced a reduction in hospitalizations, particularly psychiatric hospitalizations, after program initiation.** Members in the ACT program experienced reductions in both medical and psychiatric hospitalizations after enrollment in the program. The eight percent relative decrease in psychiatric hospitalizations was statistically significant. Furthermore, members in ACT also experienced an eight percent relative reduction in emergency department (ED) visits after program initiation that was significant at the .1 level ( $p < 0.10$ ).

**Relative to a comparison group, ACT members experienced a significant reduction in ED visits after receiving ACT services.** ACT members experienced a statistically significant 8 percent decrease in ED visits per 1,000 members per quarter, compared to a 5 percent increase for the matched comparison group. Though not significant, members in ACT experienced a larger decrease in inpatient psychiatric hospitalizations per 1,000 members per quarter than the comparison group. However, ACT members also experienced a significant increase in medical hospitalizations relative to the comparison group. Mercy Maricopa leadership described partnerships between ACT teams and primary-care providers that may lead to an increase in referrals and the receipt of necessary medical care for ACT members.



## What are the program considerations for the Assertive Community Treatment program?

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Both stakeholders and Mercy Maricopa staff identified several lessons learned during the development and operation of the program that may affect the success of the ACT program and members' access to care. These considerations included the importance of receiving input from diverse stakeholders and developing a variety of partnerships; according to providers, these relationships have strengthened Maricopa County's safety net for the SMI population and resulted in the more effective and strategic allocation of resources, pairing funding across sources to increase their impact. In addition, these relationships and input from partners allowed Mercy Maricopa to identify overlaps with existing community services and gaps in care and to strategically allocate funding to those services that require additional support.

Challenges related to the ACT program also emerged from the interviews. Clinical staff and stakeholders noted resource limitations—especially housing and transportation—as barriers to care. Clinical providers and Mercy Maricopa staff also described initial difficulties adjusting to the Fidelity model, as they had to reorganize their ACT teams, given the new standards surrounding licensing and educational background, forcing some staff into lower-level positions or out of a job altogether. To address this, Mercy Maricopa invested in robust educational efforts to implement the ACT teams with Fidelity and, as a result, stakeholders agreed that the transition to the Fidelity model has enhanced member autonomy and service choice.

## What are the policy observations for the Assertive Community Treatment program?

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Prior randomized controlled trials and observational research have found that ACT programs reduce mental health care utilization, increase housing stability and moderately improve symptoms of SMI.<sup>i,ii,iii,iv,v</sup> We found a statistically significant reduction in ED visits for ACT members after receiving program services relative to a comparison group. We also found a reduction in medical and psychiatric hospitalizations for members enrolled in ACT. The significant reduction in psychiatric hospitalizations in our pre-post analysis persisted after the inclusion of a comparison group (though the latter result was not statistically significant). Not all of the promising findings from this study were statistically significant. This may be due to our limited study time period. Many of the benefits to cost and utilization may occur over a longer period, and the literature largely attributes cost savings to reductions in hospitalizations.<sup>vi</sup> In an evaluation of ACT effectiveness as compared to standard case management, the ACT program did not prove to be more cost effective standard case management until three years after the programs' implementation.<sup>vii</sup> From these results and our findings, we can anticipate that additional reductions in

utilization and cost may occur over a longer period of time. These findings when combined with the existing literature, illustrate the value that integrated care teams can have on reducing costs and improving utilization-based quality measures for high-acuity clients.

## Introduction and Methods

### Introduction

Aetna contracted with NORC at the University of Chicago (NORC) to evaluate several supportive services available for individuals with serious mental illness (SMI) enrolled in the Mercy Maricopa Integrated Care (Mercy Maricopa) Medicaid managed care plan in Maricopa and parts of Pinal County, Arizona. We conducted an evaluation of several Mercy Maricopa programs and services, specifically the Permanent Supportive Housing (PSH) program, and the Assertive Community Treatment (ACT) program, and conducted a review of the court services activities and supported employment services. We analyzed enrollment and claims files from Mercy Maricopa and conducted a series of semi-structured interviews with stakeholders, including government officials, service providers, and member advocates. This mixed-methods study examines and provides information on the impact of the ACT program for the SMI population on cost, utilization, and member experience.

### Background

In recent years, concerns about the health and well-being of individuals have included a focus on how personal, interpersonal, community, and systemic factors play a role in individuals' physical and mental health. Evidence shows interventions targeting these factors, such as support obtaining and retaining stable housing and employment, have far-reaching impacts that extend to areas of health such as chronic disease management, mental health stabilization, and substance use treatment.<sup>ix</sup> Studies have shown that investments in these interventions may improve health outcomes and can subsequently reduce costs by decreasing hospitalizations, admissions for psychiatric care, and length of hospital stays, particularly for high-risk populations such as individuals with SMI.<sup>x</sup>

Individuals eligible for SMI services are more likely to face unemployment, arrests, and homelessness compared to those without mental illness.<sup>xi</sup> Research estimates that approximately 26 percent of adults who are homeless and staying in shelters live with an SMI, and approximately 24 percent of state prisoners have “a recent history of a mental health condition.”<sup>xii,xiii</sup> Individuals with SMI are also at an increased risk of having chronic medical conditions, and, as a result, these individuals die an average of 25 years earlier than the general population, largely due to treatable medical conditions.<sup>xiv,xv</sup> It is estimated that, altogether SMI costs the United States nearly \$200 billion in

#### Serious Mental Illness

The Substance Abuse and Mental Health Services Administration (SAMHSA) defines SMI as “having, at any time during the past year, a diagnosable mental, behavioral, or emotional disorder that causes functional impairment that substantially interferes with or limits one or more major life activities.”<sup>viii</sup>

lost earnings every year.<sup>xvi</sup> For these reasons, interventions targeting individuals with SMI have become increasingly important.

Mercy Maricopa, an integrated physical and behavioral health Medicaid managed care plan, primarily serves members in Maricopa County, Arizona (including Phoenix). Mercy Maricopa is a local not-for-profit health plan sponsored by Mercy Care Plan (MCP) and Maricopa Integrated Health Systems. MCP is an Arizona nonprofit with a 28-year history of providing Medicaid managed care administration and is sponsored by Dignity Health and Carondelet Health Network. Aetna Medicaid Administrations LLC administers both Mercy Maricopa and MCP.

In March 2013, Mercy Maricopa was awarded the Regional Behavioral Health Authority (RBHA) contract for Maricopa County by the Arizona Department of Health Services (ADHS), now managed by the Arizona Health Care Cost Containment System (AHCCCS), Arizona's Medicaid agency.<sup>xvii</sup> Mercy Maricopa currently has a contract through AHCCCS to provide:

- Behavioral health services for Medicaid eligible children and adults with general mental health and substance abuse, who do not have an SMI diagnosis
- Integrated behavioral health and physical health services to Medicaid eligible adults with SMI
- Substance abuse prevention and treatment and community mental health services, as well as a range of state-funded behavioral health services, for individuals not eligible for Medicaid

In 1981, a class action suit was filed against the state. *Arnold v. Sarn* alleged that ADHS and Maricopa County did not fulfill their statutory obligations to provide a comprehensive community mental health system.<sup>xviii</sup> Under a judgment reached in 1986 and affirmed by the State Supreme Court in 1991, the state was required to provide a combination of supportive housing, supported employment, ACT, and peer and family services to individuals determined eligible for SMI services in Maricopa County.<sup>xix</sup>

In January 2014, the parties reached a settlement to the lawsuit, which included specific requirements to increase the number of individuals served by the housing, employment, ACT, and peer support services and to implement ongoing evaluation tools in line with the SAMHSA Fidelity model.<sup>6</sup> Following the settlement, AHCCCS expanded the available services that Mercy Maricopa administers to include additional ACT teams, and Mercy Maricopa continued to expand these services to additional members,

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<sup>6</sup> Mercy Maricopa uses the SAMHSA Fidelity model to examine whether a program is implemented as the developer intended and consequently whether it follows evidence-based best practice.

beyond those required by the settlement. (See Exhibit 1 for a description of Mercy Maricopa’s ACT services.)

SMI clinics identify members as eligible for ACT teams through a screening tool and members must meet specified criteria. Members can also be referred by Level 1 hospitals for ACT screenings. Members are assessed on their diagnosis, level of service need, their engagement in treatment, and risk of homelessness. Some of these specific admission criteria include pattern of frequent hospital admissions, frequent use of emergency services, members discharged from long-term hospitalizations, co-occurring substance use disorders, homelessness, involvement with the criminal justice system, not adhering to medications as prescribed, and not benefitting from traditional mental health services.<sup>7</sup>

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**Exhibit 1: Mercy Maricopa’s ACT Programs**

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## Assertive Community Treatment (ACT)<sup>xx</sup>

Mercy Maricopa supports 23 ACT teams across Maricopa County, including:

- 3 forensic ACT (FACT) teams
- 1 medical ACT (MACT) team

ACT teams provide a full range of services to people diagnosed with SMI and are available to members 24/7 on a time-unlimited basis. ACT teams directly provide:

- Psychiatric services
- Medication management
- Counseling/psychotherapy
- Housing support
- Substance abuse treatment
- Employment/rehabilitative services
- Case management services
- Peer support

ACT teams are community-based and consist of transdisciplinary staff with specialized roles. ACT teams are comprised of more than 10 professional health workers with varied experience, including:

- Psychiatrist
- Psychiatric or medical nurse
- Social worker
- Substance abuse specialist
- Vocational rehabilitation specialist
- Housing specialist

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<sup>7</sup> More information about admissions criteria can be found here:

<https://www.mercymaricopa.org/assets/pdf/providers/manuals/ACT-Operational-Manual-20170622.pdf>

- Employment specialist
- Peer specialist

## Evaluation Design and Methods

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We hypothesized that integrated care for individuals with SMI provided by a team of interdisciplinary professional health workers—through their ACT teams—may result in an increase in the use of a regular source of outpatient care and a reduction in utilization and costs associated with emergency and inpatient care. This 24 hours a day, seven days a week source of support—through the member’s ACT team—may lead to increased focus by members on their preventive health care needs thereby decreasing their need for emergency or inpatient services.

To investigate this hypothesis, NORC conducted a mixed-methods evaluation that included quantitative and qualitative data collection and analysis. The quantitative portion analyzed Mercy Maricopa’s encounter, demographic, and provider-reported information, while the qualitative portion included information gathered through structured and targeted informant interviews, as well as a review of relevant literature.

This paper examines the following research questions:

1. What impact does the Mercy Maricopa ACT program have on overall cost of care for SMI individuals?
2. What impact does the Mercy Maricopa ACT program have on utilization-based measures of quality of care for SMI individuals?
3. What impact does the Mercy Maricopa ACT program have on member health care experience?

### Quantitative Data Sources

Mercy Maricopa provided Medicaid eligibility data files, as well as claims and encounter data (hereinafter referred to as claims) for its members, with flags and enrollment dates indicating program participation. Mercy Maricopa also provided rosters of ACT program enrollees. Rosters, eligibility, and claims data were provided for dates ranging from quarter two of calendar year 2014 to quarter two of calendar year 2017. A full description of the data files provided is available in the technical appendix, Appendix A.

### Qualitative Data Sources

NORC collected the qualitative data through 25 interviews with 40 individuals representing Mercy Maricopa and their various stakeholders, such as government officials, providers, and member advocates.

NORC staff worked with Mercy Maricopa to identify organizations and individuals who had institutional knowledge of the services provided and a historical perspective on the transition to Mercy Maricopa as the RBHA. Mercy Maricopa staff initiated contact with these organizations and provided them with the research questions developed by NORC, and a NORC staff member followed up to schedule the interviews.

**Figure 1:** Stakeholder Interviews



The qualitative team of three NORC researchers conducted a site visit in Maricopa County, Arizona, on May 1-5, 2017, which included interviews with state and local government officials, Mercy Maricopa leadership and staff, clinical providers and case managers, and community organizations and advocates. NORC also conducted additional interviews by phone, including one with a stakeholder organization on May 12, 2017, as well as five interviews with court services officials throughout November 2017. NORC followed up with individual organizations and Mercy Maricopa staff with additional questions, as needed. Highly qualified NORC staff conducted the interviews. The interviews began with background on the study, as well as the overarching research questions. Interviewees were guided through the consent process, and verbal consent was obtained to record each interview. In some cases, Aetna or Mercy Maricopa staff was present for the interviews.

### Quantitative Data Analysis

The quantitative analysis presented below compares the experiences of Mercy Maricopa members with SMI enrolled in the ACT program with those of a matched group of Mercy Maricopa members with SMI who were not enrolled in the ACT program. We examined the impact of the ACT intervention on members' cost and utilization in each quarter of service enrollment. A full technical description of the

data sources and quantitative methods used for selection of individuals in both cohorts, identification of categories of claims, and analysis is available in the technical appendix, Appendix A.

First, we conducted a descriptive analysis of those individuals in the ACT program to look at the experience of those involved in the program. Specifically, we looked at their experience before and after enrollment. Then, we compared this experience to that of a matched comparison group. Specifically, we used difference-in-differences (DiD) methods to analyze the impact of the ACT program. The DiD is the difference in average outcome between the intervention and comparison group after implementation of the program minus the difference in average outcome between the intervention and comparison group before implementation of the intervention. This specification allowed us to study the impact of the program on Mercy Maricopa ACT participants compared to similar Mercy Maricopa members not enrolled in the ACT intervention.

To improve comparability by minimizing observed difference between the intervention and comparison groups, we incorporated a propensity scoring method within the DiD framework. (See Table A.2 in Appendix A for more information.)

The ACT roster files provided by Mercy Maricopa contained 2,143 unique AHCCCS identifiers for enrollees. We linked the ACT data files to claims data and restricted our analysis to members who:

- Had a valid AHCCCS identifier in the Eligibility file
- Were part of the SMI integrated care Medicaid eligible population
- Had a program enrollment date after the first date of eligibility
- Were 18 years of age or older
- Had no missing demographic information (information available in both the Medicaid eligibility file including gender, race, primary language, dual eligibility status, and indicator of death)
- Had at least one quarter of Medicaid eligibility and claims data available before and after their enrollment in the Scattered Site program<sup>8</sup>

With this, we identified 841 unique Mercy Maricopa members from quarter two of calendar year 2014 to quarter two of calendar year 2017 with enrollment dates for the ACT program. After matching ACT

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<sup>8</sup> For the treatment group, calendar quarters occurring prior to enrollment in the Scattered Site program were defined as the pre-period and calendar quarters occurring after enrollment in the program were defined as the post-period. For the comparison group, calendar quarters occurring prior to quarter two of calendar year 2015 were defined as the pre-period and the remaining quarters were defined as the post-period. More information is available on pages 25 and 26 of Appendix A.



enrollees to similar individuals from the comparison group, the number of matched ACT enrollees available for analysis was narrowed to 834.

There were limitations in identifying an appropriately matched comparison group for those members who were enrolled in Mercy Maricopa's ACT program. The first limitation was the short time period for which we had available data. To be included, members needed at least one quarter of enrollment in Mercy Maricopa in the periods before and after intervention enrollment. The data provided began in April 2014, when Mercy Maricopa became the RBHA, limiting the number of members that met our inclusion criteria. Second, we identified a propensity score-matched comparison group of members in the SMI program who did not receive ACT services. We matched members on demographic characteristics, illness burden, and total cost of care in the pre-period.<sup>9</sup> However, due to the limited availability of additional demographic data, we were unable to compare members in the ACT program with a comparison group that had a similar level of need for those services. More information on the limitations of this analysis is detailed in Appendix A.

### Qualitative Data Analysis

For the qualitative analysis, the team developed six interview protocols to capture stakeholder perspectives on each of the research questions for the study and collect contextual information about the expansion of services. The protocols were designed for Mercy Maricopa leadership, clinical providers, community advocates, state employees, city and county employees, and case managers.<sup>10</sup> The protocols had a layer of similar questions to ground the interview responses in relation to the housing, employment, ACT and court services programs provided by Mercy Maricopa, but each interview was expanded to include prompts tailored to the role of each interviewee. The protocols were reviewed by NORC's Institutional Review Board and exempted from human subjects research, before being shared with Aetna. Following the site visit, all recordings were transcribed by an external transcription agency, and transcriptions were used for the following analysis.

Transcripts of each interview were coded and analyzed for themes in response to each of the research questions through NVivo 10 software. The team used a deductive approach utilizing the research questions to organize the data and identify themes and responses. The team developed a codebook by reviewing the research questions and site visit notes and pulling keywords from these documents. (See the

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<sup>9</sup> Chronic Illness and Disability Payment System (CDPS)—a diagnosis and pharmacy based risk adjustment model—was used to account for differences in illness burden across treatment and comparison groups.

<sup>10</sup> NORC did not speak with Mercy Maricopa members due to privacy concerns. Case managers were interviewed to provide perspective on members' experiences.

table in Appendix B for the full codebook.) The team coded the first two transcripts together in order to establish a concordant coding style and address any discrepancies, and the remaining transcripts were divided between the team members, coded, and merged into a master NVivo file for subsequent analysis. The team queried various codes across the interviews and reviewed the textual data that was associated with the relevant codes. Upon full review, the NORC team identified themes that cut across interviews and were responsive to the research questions.

## Findings

In the sections below, we present the findings of our analyses of the Mercy Maricopa ACT program using Mercy Maricopa’s Medicaid claims and supplemented with stakeholder interviews. In concordance with the research questions, we examined cost, quality, and member health care experience for the ACT program.

### Who does the Assertive Community Treatment program serve?

The 834 ACT program members included in our analysis were eligible for Medicaid for an average of 13 cumulative months, or 4.4 quarters, prior to enrollment in the program. In addition, the majority of members in the ACT program were male (57%).<sup>11</sup> Compared to enrollees in the supported employment program, ACT enrollees have a slightly higher average CDPS risk score, denoting a high burden of disease among this group. This is consistent with the program goals, as ACT is the highest level of care and support for individuals diagnosed with SMI.

Exhibit 2 below shows the descriptive characteristics of members included in our analysis—in the ACT member group and comparison group after matching—with respect to demographics and health condition. Members in ACT are similar in distribution of demographics and health, but had a greater number of quarters enrolled in Mercy Maricopa than comparators.

**Exhibit 2:** Descriptive Characteristics for ACT Program and Matched Comparison Group Members

Variable	ACT	Comparison
Number of Unique Members from Q2 2014 to Q2 2017	834	834
Mean Number of Quarters Enrolled in Medicaid in Pre-Period [Range]	<b>4.4*** [1 - 11]</b>	<b>2.0*** [1 - 5]</b>
<b>Gender % (N)</b>		
Female	43.0 (359)	39.2 (327)
Male	57.0 (475)	60.8 (507)
<b>Age % (N)</b>		
18-24 years	11.8 (98)	12.1 (101)
25-34 years	26.7 (223)	28.1 (234)
35-44 years	18.0 (150)	17.3 (144)
45-54 years	26.3 (219)	26.7 (223)
55-64 years	14.7 (123)	13.5 (113)
≥65 years	2.5 (21)	2.3 (19)

<sup>11</sup> Throughout this report, unless otherwise noted, when we refer to Assertive Community Treatment program members, we are referring to the members in our Assertive Community Treatment program sample.

Variable	ACT	Comparison
<b>Race/Ethnicity % (N)</b>		
White	45.8 (382)	45.4 (379)
Black/African American	9.7 (81)	9.0 (75)
Asian/Pacific Islander	1.0 (8)	1.0 (8)
American Indian/Alaska Native	1.9 (16)	1.9 (16)
Hispanic	8.0 (67)	7.9 (66)
Other <sup>^</sup>	33.6 (280)	34.8 (290)
<b>Dual Eligible Status % (N)</b>		
Dually Eligible	2.8 (23)	2.3 (19)
<b>Primary Language % (N)</b>		
English	96.3 (803)	95.7 (798)
<b>Risk Score</b>		
CDPS Risk Score <sup>a</sup> , Mean (Standard Deviation)	1.3 (0.9)	1.3 (1.0)

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.

<sup>^</sup>Race/Ethnicity of “Other” denotes data where member race is entered as “Unknown” or “No Ethnicity.”

<sup>a</sup>The Chronic Illness and Disability Payment System (CDPS)—a diagnosis and pharmacy based risk adjustment model—was used to account for differences in illness burden across the treatment and comparison groups. The CDPS risk score factors in an individual’s age, gender, cumulative diagnoses, and cumulative disease severity to create a value used for risk adjustment, a higher score from zero denotes a higher burden of disease.

### How does the Assertive Community Treatment program work?

During our interviews, stakeholders told us they believe member health care experience has been positively impacted under Mercy Maricopa’s integrated model and the expansion of ACT services. Stakeholders agreed Mercy Maricopa has increased access to ACT services and affirmed the success of their member-centered model. Specifically, stakeholders highlighted the importance of increased access to services and a new focus on member-centered care as contributing to the positive impact on member health care experience within the program.

#### Increased Access to Care

The structure of the ACT team has been vital to improving members’ access to comprehensive physical and behavioral care and supportive services. As noted earlier, the ACT teams are composed of 10-15 staff members who fill a variety of specialty roles. The teams have a

#### Member Perspective

As a 29-year old man with schizoaffective and poly-substance use disorders, **Ralph** found himself addicted to meth and living on the streets. But when he became engaged with a Mercy Maricopa ACT team in 2015, Ralph secured stable housing and began attending rehab. Now sober for more than a year, Ralph is a “changed person.” Through his ACT team, Ralph has been able to gain employment and is in the process of obtaining his GED. Being able to access housing immediately, without any restrictions, enabled Ralph to stabilize his life and engage in the full range of Mercy Maricopa’s supportive services.



caseload that is limited to 100 members, which enables staff to provide more intensive services that extend 24 hours per day, seven days per week. Additional forensic and medical ACT teams provide

specialized care to the criminal justice and medically acute populations, respectively. ACT teams are specially designed to provide wrap-around services to members and, in that vein, are able to foster member access to care, treatment, housing, employment, and other support as needed.

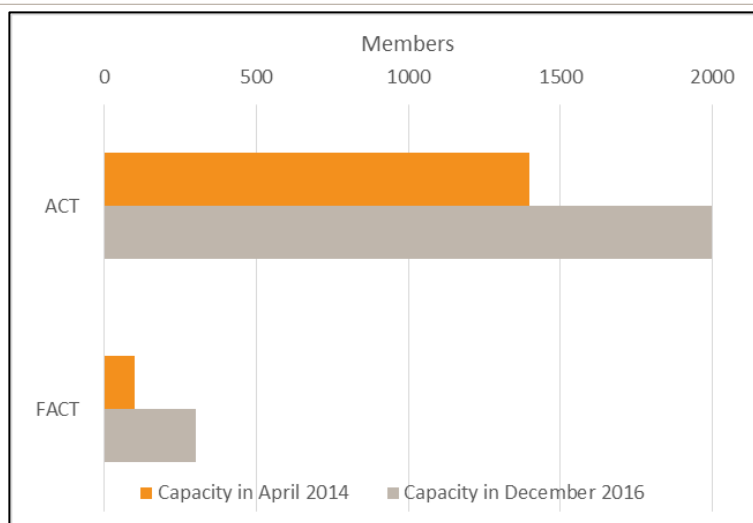
*Support service integration.* Obtaining comprehensive behavioral and physical health care that addresses complex needs is a challenging task for the individuals with SMI. However, the increased integration of a variety of services such as primary and behavioral health care, as well as housing and employment support, has enabled members to access care more conveniently and at more points of entry. The increased number of ACT teams has contributed to the expanded integration of services. From the time Mercy Maricopa was awarded the RBHA contract, it has pursued a model of care integration that connects behavioral and physical health care. Integrated care streamlines the process of accessing care for individuals with SMI who are now able to obtain both sets of services through Mercy Maricopa's network. In addition, Mercy Maricopa co-located employment and housing specialists at the clinics, thereby creating a "one-stop shop" for members to access the care and services they need. Additionally, the ACT teams are able to merge the integration and co-location by providing health and behavioral clinicians alongside supportive services providers.

The location of the ACT teams has enabled more members to receive services from a structure where the clinical team is able to directly communicate with housing and employment providers, facilitating immediate receipt of a range of services and reducing the interruption that occurs when patients must seek services from a variety of sources. The integrated teams promote communication between providers and provides a broader base of staff knowledge for organizing services for the member. For example, one ACT team specialist described the benefit of having nurse practitioners on the team who were able to conduct specialized eye exams for a patient who was diabetic. The specialist noted that his expertise alone would not have enabled the member to obtain a diabetic eye exam and only through direct collaboration with the medical professionals on the team were they able to meet the full needs of the member. Because of the integrated service model, which necessitates frequent communication between the primary care provider and other service providers, the nurse was able to identify a service gap and connect the patient with an eye specialist. Across the organization, members such as this one have experienced the benefits of the co-location and supportive service integration model as employed by the ACT teams.

**Assertive Community Treatment program expansion.** As the designated RBHA, Mercy Maricopa has been committed to not only fulfilling, but also exceeding, the requirements of the *Arnold v. Sarn* settlement. The expansion in service capacity offers evidence of its progress towards a more robust,

responsive system of care for the SMI population in Maricopa County. Mercy Maricopa has adhered to the *Arnold v. Sarn* agreement and met all of the expansion targets stipulated in the lawsuit for ACT services by increasing the number of teams from 14 in April 2014 to 24 in December 2016. The 24 ACT entities are composed of 20 ACT teams, three forensic ACT (FACT)

**Figure 2: ACT Service Capacity**



teams, and one medical ACT (MACT) team. Mercy Maricopa established the specialty ACT teams in order to better meet the needs of historically underserved populations, exceeding the requirements of the *Arnold v. Sarn* lawsuit. By dedicating ACT teams to priority populations, Mercy Maricopa and its partners showed a commitment to prioritizing member needs, and a dedication to working with community stakeholders to ensure those needs were identified and addressed appropriately.

Stakeholders across a variety of backgrounds have noted the important and significant work of the ACT teams. The ACT program expansion has opened capacity to an additional 900 members, ensuring more individuals with higher needs are accessing the care and support they require for stabilization and long-term success. The ACT teams provide several types of supportive services that are also provided to the general membership, including opportunities for employment and job readiness, assistance in finding and maintaining housing, and ongoing peer support from individuals who personally understand the member experience and can help direct them toward resources.

### Member-Centered Model

Staff and stakeholders describe Mercy Maricopa’s approach to providing services as “member-centric.” Informed by the SAMHSA Fidelity model,<sup>12</sup> the organization focuses on ensuring that members have

<sup>12</sup> Mercy Maricopa adheres to the SAMHSA Fidelity models for their programs. SAMHSA defines fidelity as “the degree to which a program is implemented as its developer intended. If a program closely adheres to the original strategy, it’s more likely

maximum agency to obtain and direct services and supports to address their needs. To implement this strategy, Mercy Maricopa expanded staff in its Office of Individual and Family Affairs,<sup>13</sup> bolstered its external relationships, and worked with providers on best practices that follow the Fidelity model. Because of these internal efforts, Mercy Maricopa members have increased autonomy in directing their care, and are able to choose among providers and services.

**Provider choice.** Mercy Maricopa gives members a choice among providers throughout the continuum of care. When a member first enters the Mercy Maricopa program, they receive an assessment by the Crisis Response Network (CRN), during which CRN staff identifies available providers closest to the member's current housing from which the member can select. After a member makes this initial selection and begins receiving services at a particular contracted clinic, he or she can request a transfer to another clinic location at any time. This supports continuous access to care even if members move based on available housing or employment opportunities, and allows members to find providers who are the best fit.



**Service choice.** Mercy Maricopa structures their ACT programs to support the preferences and independence of each member. As noted above, the development of these programs is built upon the SAMHSA Fidelity model. Providers reoriented their focus from provider-directed care to that of member-directed goals.

### How does the Assertive Community Treatment program affect health care costs?

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Across varying lengths of Medicaid eligibility, ACT members' total Medicaid costs are approximately \$16,000 per member per quarter in the period prior to becoming enrolled in the ACT program. This is higher than members in other Mercy Maricopa programs (such as supported employment). This high cost is likely due to the high-acuity of individuals enrolled in the ACT program.

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to replicate the positive outcomes of the program's initial implementation or testing." See <https://www.samhsa.gov/capt/applying-strategic-prevention-framework/step5-evaluation/process-outcomes-evaluation>

<sup>13</sup> In addition to the Mercy Maricopa Office of Individual and Family Affairs (OIFA), AHCCCS also maintains its own, separate OIFA.

Total costs decreased for individuals who were enrolled in the ACT program, but this change was not significant. This cost decrease was driven by significant decreases in behavioral health costs. Behavioral health professional services costs showed a relative decrease of six percent per member per quarter in the period after program enrollment compared to the period prior. Overall facility costs showed a relative decrease of 11 percent, represented in large part by a decrease in behavioral health facility costs. Inpatient facility costs also showed a downward trend, but unlike the decrease in total facility costs, it was not significant. Pharmacy costs increased significantly (a relative increase of 13 percent per member per quarter). Exhibit 3 below presents the differences in costs associated with those individuals who were enrolled in the ACT intervention group, before their enrollment in ACT (pre) and after they began receiving ACT services (post). These outcomes do not account for secular trends, or factors outside of the program that might influence costs such as initiatives targeting the same population or unrelated changes in practice patterns.

**Exhibit 3:** Cost of Care in the Pre and Post Period for ACT Program Members, per Member per Quarter

Outcomes	Pre ACT (\$)	Post ACT (\$)	Difference (\$)
<b>Total Cost of Care</b> <i>(facility, professional services, pharmacy)</i>	16059 [15485, 16633]	15324 [14511, 16137]	-734 [-1483, 15] -5%
<b>All Facility Costs</b>	5740 [5397, 6083]	5132 [4585, 5679]	<b>-608*</b> <b>[-1160, -56]</b> -11%
<i>Facility cost: Physical health only</i>	1516 [1369, 1663]	1456 [1242, 1670]	-60 [-262, 142] -4%
<i>Facility cost: Behavioral health only</i>	4637 [4331, 4943]	4404 [3829, 4979]	-233 [-802, 336] -5%
<b>Inpatient Facility Cost</b>	1733 [1522, 1944]	1438 [1083, 1793]	-295 [-665, 75] -17%
<b>Professional Services Costs</b>	7964 [7629, 8299]	7479 [7085, 7873]	<b>-485**</b> <b>[-810, -160]</b> -6%
<i>Professional services cost: Physical health only</i>	1007 [927, 1087]	950 [839, 1061]	-57 [-149, 35] -6%
<i>Professional services cost: Behavioral health only</i>	6969 [6644, 7294]	6558 [6182, 6934]	<b>-410**</b> <b>[-722, -98]</b> -6%
<b>Pharmacy Costs</b>	1833 [1700, 1966]	2079 [1848, 2310]	<b>246*</b> <b>[ 25, 467]</b> 13%
<b>Total Physical Health Costs</b> <i>(facility and professional services)</i>	2507 [2297, 2717]	2395 [2106, 2684]	-112 [-374, 150] -4%
<b>Total Behavioral Health Costs</b> <i>(facility and professional services)</i>	12008 [11454, 12562]	11200 [10442, 11958]	<b>-808*</b> <b>[-1486, -130]</b> -7%

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.



Please note that because these results are adjusted (i.e., we adjust the statistical model to control for the influence of member characteristics, such as demographics), they will not add up within columns. This adjustment allows for a more precise estimate for the comparison and intervention groups that are not unduly influenced by secular trends.

We estimated the average quarterly impact of the ACT program by comparing pre and post differences for ACT program members and a comparison group using a difference-in-differences (DiD) analysis (Exhibit 4). Members receiving ACT services, as well as those in the matched comparison group, experienced a decrease in total cost of care in the post-period. However, the decrease in total cost of care was marginally higher for ACT members. When compared to those not enrolled, the total cost of care for ACT members decreased by \$187 per member per quarter. Total behavioral health costs decreased \$181 per member per quarter when compared to those who were not enrolled in the ACT program, contributing in large part to the decrease in total cost of care. Exhibit 4 below displays the full results for the average quarterly impact on cost for members enrolled in the ACT program relative to the comparison group, across the observed enrollment period.

Despite not achieving statistical significance, these findings are consistent with the findings of numerous other studies that show the cost effectiveness of the ACT model. Several randomized controlled trials have found that the cost of ACT programs are generally less than the cost of alternative case management approaches.<sup>xxi,xxii,xxiii,xxiv</sup> For instance, a study of 82 individuals with a history of psychiatric hospitalizations found that ACT care costs around \$1,500 less per year than care provided at community-based drop-in centers.<sup>xxv</sup> Most studies that report similar reductions in cost attribute such savings to decreased use of inpatient care.<sup>xxvi,xxvii</sup> Many of the studies that cite reductions in cost, likewise report differences that are not statistically significant. This suggests the need for additional research conducted over a longer period of time.

**Exhibit 4:** Cost of Care Outcomes for ACT Program Members and the Matched Comparison Group. Difference-in-Differences Results, per Members per Quarter

Outcomes	Intervention Difference (\$)	Comparison Difference (\$)	DiD result (\$)
<b>Total Cost of Care</b> <i>(facility, professional services, pharmacy)</i>	-734 [-1483, 15] -5%	-548 [-1272, 176] -4%	-187 [-1222, 848]
<b>All Facility Costs</b>	<b>-608*</b> <b>[-1160, -56]</b> <b>-11%</b>	-494 [-1169, 181] -8%	-114 [-988, 760]
<i>Facility cost: Physical health only</i>	-60 [-262, 142] -4%	-253 [-562, 56] -11%	193 [-176, 562]
<i>Facility cost: Behavioral health only</i>	-233 [-802, 336] -5%	292 [-185, 769] 9%	-526 [-1268, 216]

<b>Inpatient Facility Cost</b>	-295 [-665, 75] -17%	-27 [-420, 366] -2%	-269 [-807, 269]
<b>Professional Services Costs</b>	<b>-485**</b> <b>[-810, -160]</b> <b>-6%</b>	<b>-482**</b> <b>[-862, -102]</b> <b>-6%</b>	-3 [-502, 496]
<i>Professional services cost: Physical health only</i>	-57 [-149, 35] -6%	12 [-92, 116] 1%	-69 [-207, 69]
<i>Professional services cost: Behavioral health only</i>	<b>-410**</b> <b>[-722, -98]</b> <b>-6%</b>	<b>-486**</b> <b>[-849, -123]</b> <b>-7%</b>	76 [-401, 553]
<b>Pharmacy Costs</b>	<b>246*</b> <b>[ 25, 467]</b> <b>13%</b>	185 [-26, 396] 14%	61 [-244, 366]
<b>Total Physical Health Costs (facility and professional services)</b>	-112 [-374, 150] -4%	-186 [-556, 184] -5%	74 [-379, 526]
<b>Total Behavioral Health Costs (facility and professional services)</b>	<b>-808**</b> <b>[-1486, -130]</b> <b>-7%</b>	-627 [-1288, 34] -5%	-181 [-1123, 761]

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01

Models are adjusted for age, race, gender, English as primary language, dual eligibility, CDPS risk score, and enrollment throughout the entire quarter. Quarterly impact is defined as the average quarterly DiD estimate per quarter of program enrollment.


### How does the Assertive Community Treatment program affect utilization-based measures of quality?

NORC examined changes in utilization rates in order to assess the impact of the ACT program on quality of care. Specifically, inpatient medical and psychiatric hospitalizations, as well as outpatient emergency department (ED) visits were compared across the study and comparison populations.

In the period prior to enrollment in the ACT program, inpatient medical hospitalizations for the intervention group averaged 104 visits per 1,000 members per quarter, and psychiatric hospitalizations averaged 639 visits per 1,000 members per

quarter. Members who were enrolled in ACT experienced decreases in inpatient medical and psychiatric hospitalizations, between when they were enrolled in the ACT program (pre) and after they began

**Member Perspective**



**Carlos** is a 34-year-old male with a history of self-harm, schizoaffective disorder, bipolar disorder, and substance use disorder. After becoming incarcerated a handful of times, Carlos was destined for prison, until Mercy Maricopa staff stepped in and convinced the court to release him into their care. Once Carlos was granted probation, Mercy Maricopa clinic staff secured housing for him. Although Carlos used to be admitted to the hospital many times throughout the year, since working with his FACT team over the last three years, he has avoided these regular readmissions. Once deemed “hopeless” by some, since working with his care team and accessing Mercy Maricopa’s supportive services, Carlos now lives independently, is employed, and has avoided re-incarceration, crisis services, and hospitalizations.

receiving ACT services (post). The decrease in psychiatric hospitalizations was significant. Exhibit 5 below presents the differences in quality measures associated with those individuals who were enrolled in the ACT intervention group, before and after their enrollment. In addition, ACT members experienced a significant decline, 8 percent, in outpatient ED visits. These outcomes are descriptive and do not account for secular trends, or factors outside of the program that might influence cost.

**Exhibit 5:** Quality of Care Outcomes in the Pre and Post Period for ACT Program Members, per 1,000 Members per Quarter

Outcomes	ACT Pre	ACT Post	Difference
<b>Number of Inpatient Medical Hospitalizations</b> (per 1,000 members per quarter)	104 [ 93, 115]	99 [79, 119]	-5 [-25, 15] -5%
<b>Number of Inpatient Psychiatric Hospitalizations</b> (per 1,000 members per quarter)	639 [600, 678]	587 [537, 637]	<b>-53**</b> <b>[-89, -17]</b> <b>-8%</b>
<b>Number of Outpatient ED Hospitalizations</b> (per 1,000 members per quarter)	1589 [1491, 1687]	1459 [1327, 1591]	<b>-130*</b> <b>[-257, -3]</b> <b>-8%</b>

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01

We estimated the average quarterly impact of the ACT program by comparing pre and post differences for ACT members and the comparison group in a difference-in-differences (DiD) analysis. Relative to the matched comparison group not enrolled in the ACT program, ACT members averaged 187 fewer outpatient ED visits (per 1,000 enrollees) per quarter. This decrease in utilization rates represents a statistically significant result. Exhibit 6 below illustrates the ACT program’s average quarterly impact on quality, as measured by utilization, relative to the comparison group. We also found a statistically significant increase in inpatient medical hospitalizations of 40 visits per 1,000 ACT members per quarter. Increased partnerships between ACT teams and primary care providers may improve and expand necessary treatment for ACT members who are at higher medical risk and less likely to have engaged the medical system, thus increasing hospitalizations once connected with care. Inpatient psychiatric hospitalizations showed a non-significant decrease, but the significant decreases shown in the individual cohorts indicate influences such as other outside initiatives or market forces that may be driving a decrease in this type of utilization in both groups. Prior research shows that ACT models can reduce inpatient mental health care utilization.<sup>xxviii,xxix,xxx</sup>

**Exhibit 6:** Quality of Care Outcomes for ACT Program Members and the Matched Comparison Group. Difference-in-Differences Results, per 1,000 Members per Quarter

Outcomes	ACT Difference	Comparison Difference	DiD
<b>Number of Inpatient Medical Hospitalizations</b> (per 1,000 members per quarter)	-5 [-25, 15] -5%	<b>-45***</b> [-71, -19] <b>-25%</b>	<b>40* [8, 72]</b>
<b>Number of Inpatient Psychiatric Hospitalizations</b> (per 1,000 members per quarter)	<b>-53**</b> [-89, -17] <b>-8%</b>	<b>-50**</b> [-84, -16] <b>-11%</b>	-2 [-52, 48]
<b>Number of Outpatient ED Hospitalizations</b> (per 1,000 members per quarter)	<b>-130*</b> [-257, -3] <b>-8%</b>	56 [-48, 160] 5%	<b>-187* [-352, -22]</b>

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01

Quarterly impact is the average quarterly DiD estimate per quarter of program enrollment. Models are adjusted for age, race, gender, English as primary language, dual eligibility, CDPS risk score, and enrollment throughout the entire quarter.

### What are the program considerations for the Assertive Community Treatment program?

Both stakeholders and Mercy Maricopa staff identified several lessons learned during the development and operation of the program that may impact the success of the ACT program and members’ access to care, including the diversity of stakeholders and partnerships, staff retention, resource limitations, and adjustment to the Fidelity model.

*Diverse stakeholders and partnerships.* Stakeholders and Mercy Maricopa agreed that the integration and expansion of supportive services through the ACT program increased member access, and they also identified several related successes and challenges. One of these is the benefit of partnerships and investments in relationships with a broader and more diverse stakeholder base. Mercy Maricopa achieved increased access to care for their members in part because of the deep and diverse partnerships developed across government officials, providers, and community stakeholders. In establishing the program, Mercy Maricopa made a concerted effort to develop strategies serving the best interests of the SMI population.

Related to its government partnerships, state, county, and city staff attributed Mercy Maricopa’s strong working relationship with government entities to its participation in many different forums and coalitions. Mercy Maricopa has utilized the breadth of experience of government staff, community service organization employees, providers, members, and their families to improve its services. Mercy Maricopa proactively included a diverse set of voices to identify concerns and incorporated their ideas in its approach, in order to respond to community needs and concerns more quickly.

Mercy Maricopa developed and leveraged robust relationships with providers and community advocates to increase members’ access to the full range of services available in the community. According to providers, these relationships have strengthened the fabric of Maricopa County’s safety net for the SMI population and resulted in the more effective and strategic allocation of resources, pairing funding across sources

**Member Perspective**



**Paul**, a 50-year-old man with schizophrenia, was sentenced as “guilty except insane” to nearly two decades behind bars after committing a crime against his family. Eventually privileged out on conditional release into the community, Paul began working with one of Mercy Maricopa’s ACT teams and developed a treatment plan, with a dream of becoming an automotive service technician. Paul’s ACT team met with him seven-days a week, ensuring his adherence to his medication and helping him secure stable housing and access educational services. Paul has since enrolled in school and, despite struggling with dyslexia, will be graduating at the top of his class in November.

to multiply their impact. These relationships and input from partners allowed Mercy Maricopa to identify overlaps with existing community services and gaps in care and to strategically allocate funding to those services that require additional support. Providers noted that Mercy Maricopa has heeded the recommendations of clinic providers and invested in higher-cost strategies, such as integrated clinical care programs, in order to strengthen the care provided to SMI clients.

**Resource limitations.** Housing resource limitations and other constraints continue to limit Mercy Maricopa’s ability to consistently provide the full scope of services to ACT members. Severe housing shortages and rapidly increasing rents mean that dollars allocated for housing are unable to go as far. Members using vouchers are also not as competitive as privately paying renters, given that their voucher allocation does not meet market-rate rental prices, and property owners are hesitant to rent to individuals with vouchers, especially those who may have unstable rental histories or criminal convictions. Members find that it takes longer to obtain housing in the current, tight housing market, even once they have a voucher in hand, and apartments that are available at their price-point are unsuitable because of safety issues and location. Mercy Maricopa has made efforts to counterbalance the market increases in rental prices by approving higher rents through reasonable accommodations requests and by partnering with housing providers to increase available housing options.

Furthermore, crime-free housing initiatives, which are increasingly prevalent in the Maricopa County region, shut out SMI individuals with any criminal background, further restricting available housing to this subgroup. These crime-free, drug-free initiatives partner with property owners, residents, and law enforcement officials to combat crime in multi-housing properties through a training and certification process.<sup>xxxix</sup> These issues disproportionately affect ACT teams' work, because of the higher rate of ACT team members who have interacted with the criminal justice system. One ACT team staff member noted that the list of available properties for individuals with criminal histories was significantly smaller than the list of those open for individuals who do not have a criminal record. This narrowed field makes it even more challenging for supported housing staff to help members find available properties.

Although Mercy Maricopa and its partners are working to educate property owners about the benefits of housing members with SMI who are supported in maintaining their tenancy, it continues to be difficult for this population to access housing. A review of the literature surrounding similar social service integration programs revealed that programs that incorporate housing services often acknowledged the widespread shortages in available, affordable housing.<sup>xxxix</sup> This issue is a common obstacle faced by programs serving large numbers of high-risk, high-need individuals in need of housing.

Stakeholders also noted that transportation limitations are a barrier. Specifically, limitations in the public transportation system reduce the employment opportunities that members are able to access. Although employment support providers noted that they have driven members to interviews, that option is not tenable for regular employment. As a result, a member may receive a job offer but be unable to accept it due to the job's distance from home, complex or non-existent bus and light-rail routes, or irregular off-hours bus schedules for evening or overnight shifts.

*Adjustment to Fidelity model.* As Mercy Maricopa introduced SAMHSA's Fidelity model, service providers experienced challenges in aligning with the new requirements, as many had been using different models. Stakeholders noted that the initial transition to the Fidelity model was challenging, as it required staff reassignment based on new credentialing requirements, as well as changes—some substantial—to former policies and procedures. Providers described having to reorganize their ACT teams, given the new standards surrounding licensing and educational background, forcing some staff into lower-level positions or out of a job altogether. Providers not only described experiencing these types of structural changes, but also necessary philosophical shifts. For instance, one provider recalled being “blown away” by the new models when it was first introduced, and explained the initial struggle in reorienting the clinic and staff to the new framework.

Ultimately, the transition to the Fidelity model has enhanced member autonomy and service choice. For example, one stakeholder noted that before the transition, the ACT teams viewed members' homes to be under their jurisdiction rather than members' private homes. Consequently, the ACT team had a copy of the keys, maintained the lease, and stopped by the apartments to distribute medication or for other reasons the ACT team deemed necessary. The Fidelity model clarified that members should have private access to their homes. It was a significant shift for the organization, but one that affirmed the importance of member-guided care. Initial Fidelity scores reflected this tension and led Mercy Maricopa to invest in robust educational efforts to shift providers' perspectives towards the unconditional model of connecting members to services, and as a result, Mercy Maricopa has seen improvement in providers' adherence to the member-centric model.

## Concluding Observations

The ACT program provides the highest level of community-based care and support for members with SMI. Multi-disciplinary ACT teams offer participants a full range of services and unlimited availability (24 hours per days, seven days a week) for participants. Research surrounding the efficacy of the ACT program is robust. The literature shows that these programs can reduce mental health care utilization, increase housing stability, and even moderately improve symptoms of SMI.<sup>xxxiii</sup>

Our study found decreases in both inpatient medical and psychiatric hospitalizations, between when a member was enrolled in the ACT program (pre) and after enrollment (post). The decrease in psychiatric hospitalizations was significant (8 percent reduction). We also found a significant decrease in ED visits for participating members (8 percent). Even when we introduced a comparison group of non-ACT members, we found that ACT members experienced significantly fewer outpatient ED visits than the comparison group. However, we did find that the comparison group experienced a similar reduction in psychiatric hospitalizations.

These results reinforce that integrated care teams, such as the ACT teams, can be effective structures to manage care for high-acuity members with SMI. The integration and co-location of staff is facilitated by a team-based approach and reduces a number of barriers to care experienced by members who are served by multiple staff. ACT teams can easily share information with each other about member needs and can work as a group to provide care—where one staff member may miss or be unable to address a concern, others are available to do so. The strengths of this interdisciplinary approach to care, the strong partnerships, and a member-centered approach are reflected in the outcomes presented in this report. Continued evaluation of the ACT program will ensure that Mercy Maricopa and other stakeholders can identify additional ways in which integrated programs can best support and enhance the well-being of their members while lowering costs and increasing quality.



## Appendix A: Quantitative Methods

### Overview

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This appendix offers an overview of secondary data collection for the NORC evaluation and further detail on our analytic methods. We provide details of our methods and describe awardees' data sources and populations, measure specifications, and analytic models. We also detail results for our propensity score matching and difference-in-differences methods.

### Data Sources

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NORC received separate rosters from Mercy Maricopa used to track individuals' enrollment in housing, employment, Assertive Community Treatment, and Criminal Justice Engagement Team services.

#### Service Roster Excel files received:

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We received documentation in Microsoft Excel format listing Mercy Maricopa members enrolled in various programs to be investigated in our analysis.

- “Housing and Employment member list”
- “SE & Employ Members – Nov 2014 – April 2017”
- “PSH Services By Month 2016-2017”
- “PSH Subsidies By Month 2015-2017”
- “PSH AVS provider list”
- “Scattered Site Referrals”
- “Scattered Site Waitlist”
- “ACT roster December 2016”
- “CJET Census” (updated October 2017)
- “CLP Rosters”

We also received a CSV file titled “Member Attributes” which provided data on individuals who were receiving health coverage from the prison system. We decided to rely on Criminal Justice Engagement Team roster data to capture cost and utilization specifically for Mercy Maricopa members enrolled in the Criminal Justice Engagement Team program.

We received a “member demographic data extract” which supplies additional demographics information for Mercy Maricopa members. After cleaning the data, we found that only 56% of the Mercy Maricopa members in the Medicaid eligibility file had additional demographic data in the demographic file. We decided not to use this additional demographic data in our matching and analysis models in order to avoid reducing our sample to size to individuals with available demographic file data. The only source of demographic data used in this analysis is the less comprehensive data available in the Medicaid eligibility file, including variables such as gender, race, age, and primary language. As this information was used for propensity score matching, members with any missing demographic information in the Medicaid eligibility file were excluded from the analysis.

NORC received Medicaid claims files from Mercy Maricopa for its members. NORC used these files to identify data on cost and utilization related to Facilities (labeled by Mercy Maricopa as “Part A”), Professional Services (labeled by Mercy Maricopa as “Part B”), and Pharmacy claims for Mercy Maricopa’s SMI integrated care population. Medicaid files also included an “eligibility file” which lists member IDs included in the claims as well as dates of enrollment and demographic information.

### **Medicaid claims CSV files received:**

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We received a codebook and claims files split in CSV files by claim type. There was at least two quarters of data in each file. Date ranges for the files started in calendar year 2013 Quarter 4 and went through calendar year 2017 Quarter 2.

- Facility “Part A” Header files (“header”)
- Facility “Part A” Revenue center files (“revctr”)
- Facility “Part A” Procedure files
- Facility “Part A” Diagnosis files
- Professional services “Part B” files
- Pharmacy files
- Provider files
- Member PCP file (one file for all dates)
- Eligibility file (one file for all dates)

### **Analytic File Construction**

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After cleaning the roster files we found unique individuals with program enrollment dates and AHCCCS IDs for the Supported Employment intervention, the Permanent Supportive Housing Subsidies program,

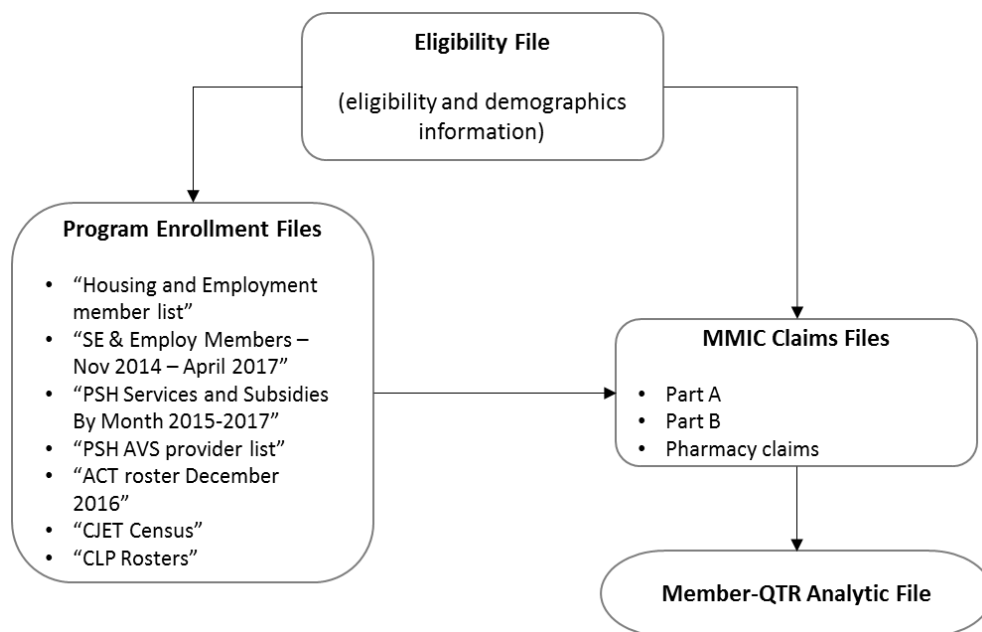
the Assertive Community Treatment program, and the Criminal Justice Engagement Team program. For the analysis of each program, IDs and enrollment dates in that program was combined with Medicaid eligibility file data to provide demographics data and quarters for which claims occurred.

We identified Mercy Maricopa claims data for the members identified in the previous step and created a member-quarter file that included average cost and quality outcome measures for each calendar quarter from quarter two of calendar year 2014 to quarter two of calendar year 2017. Members without Medicaid eligibility over an entire quarter did not have data included for that particular quarter. For the treatment group, calendar quarters occurring prior to enrollment in the Scattered Site program were defined as the pre-period and calendar quarters occurring after enrollment in the program were defined as the post-period. For the comparison group, calendar quarters occurring prior to quarter two of calendar year 2015 were defined as the pre-period and the remaining quarters were defined as the post-period. We trimmed the study period for individuals in the comparison group whose number of pre- or post-intervention quarters exceeded that of the individual in the treatment group it was matched to. This ensures that the treatment and comparison groups have similar pre and post period's exposure length. Due to the sample size available in our analytic file we present claims outcomes in a per member per quarter basis to avoid issues with sample size when presenting claims outcomes in a per member per month basis.

Types of outcomes were identified based on the claims file in which the claim was recorded (either facility based or professional services). For costs, both facility based claims and professional services are further divided into physical and behavioral health categories by identifying categories of diagnosis codes in the claims. Facility based claims that originate from inpatient admissions are also identified by diagnosis codes and revenue codes and include both physical and behavioral health inpatient claims. For utilization, hospitalizations and ED visits are identified using revenue codes.

We acquired data analysis code from the University of California, San Diego for the proprietary Chronic Illness and Disability Payment System (CDPS version 6.2). This code was used to provide a risk score for both ICD-9 and ICD-10 codes in each inpatient and outpatient claim to give us an idea of disease burden and severity experienced in each cohort. We later used this risk score in our matching and analysis models to control for severity of disease experienced in each sample.

An analytic file was constructed at the member-quarter level to list all data available for individuals in the eligibility file that met the requirements for study inclusion in the treatment or control cohorts.



## Study Population

### Sampling Frame

Our analysis only considers individuals in the eligibility file with enrollment dates after the April 2014, the start of Mercy Maricopa’s services. Claims data was available from calendar year 2014 quarter 2 and calendar year 2017 quarter 2.

### Intervention Group

The intervention groups were identified using member IDs in the service rosters.

### Comparison Group

The comparison group was drawn from the cohort of Mercy Maricopa individuals in the claims who were not enrolled in the service of interest. For the Assertive Community Treatment and Supported Employment analysis, this cohort was also required to not have taken part in any other service for which rosters were available.

### Propensity Score Matching

The final analytic file has the following qualifications for individuals to be included in our analysis.

We restricted members to those who:

- Have a valid AHCCCS identifier in the Eligibility file
- Are part of the SMI integrated care Medicaid eligible population
- Have a program enrollment date after the first date of eligibility
- Are 18 years of age or older
- Had no missing demographic information (information available in both the Medicaid eligibility file including gender, race, primary language, dual eligibility status, and indicator of death)
- Had at least one quarter of Medicaid eligibility and claims data available before and after their enrollment in the Scattered Site program

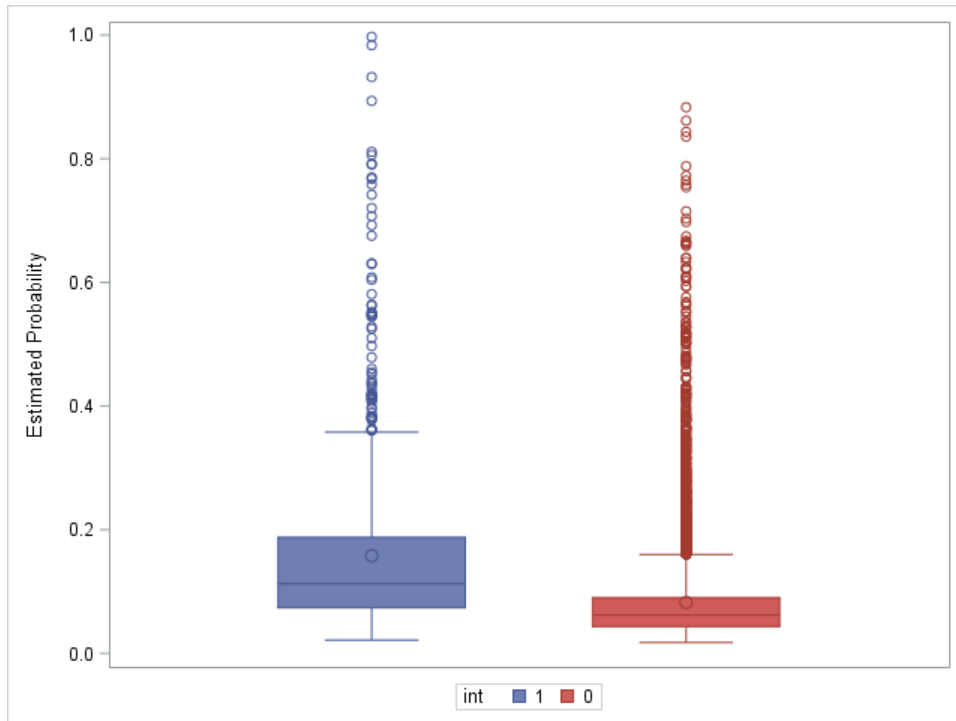
We use propensity score matching without replacement to find pairs of individuals in the comparison and intervention group with a high level of similarity based on certain covariates. The final propensity score model uses the following covariates: age, gender, race, primary language, dual eligibility status, and average quarterly total cost in the pre-period.

Exhibit A.1 shows the covariate balance and common support charts for the intervention and comparison groups before and after matching. In the matched sample, we obtain balance on all covariates. Also after matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups. Overall, the charts indicate that that propensity score matching greatly improved the comparability of the treatment and comparison groups.

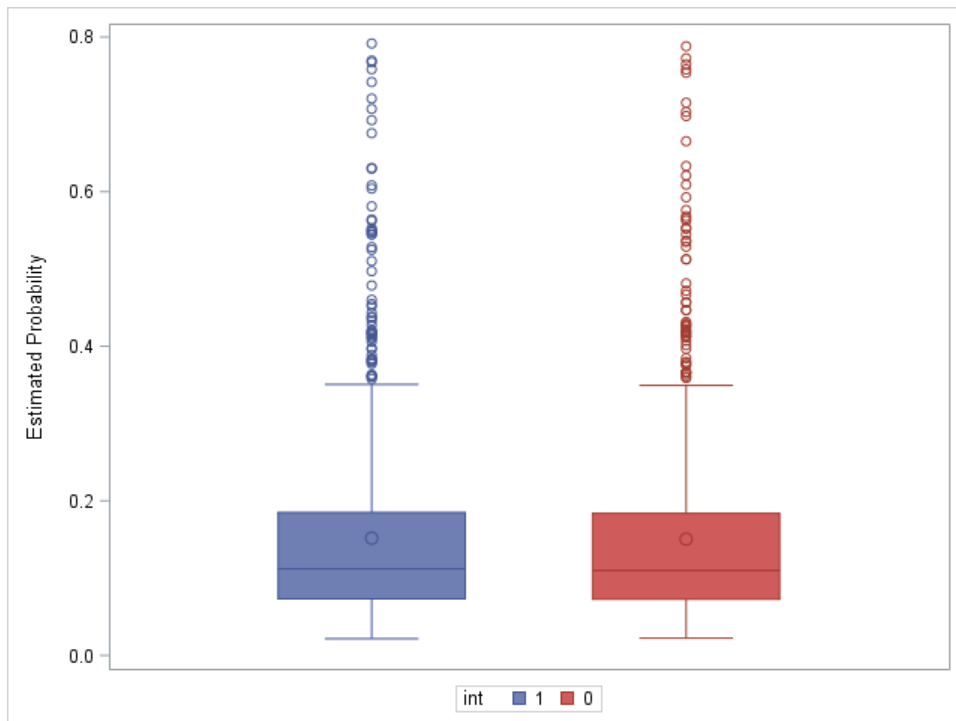
To further demonstrate the effect of propensity score matching, Exhibit A.2 shows the standardized difference between covariates in the intervention and comparison groups before and after matching. A reduction in the standardized difference to an absolute value of under 0.1 indicates that the comparability of the intervention and comparison groups increased due to propensity score matching and improved the strength of our statistical analysis.

Exhibit A.1: Balance and Common Support, Assertive Community Treatment Analysis

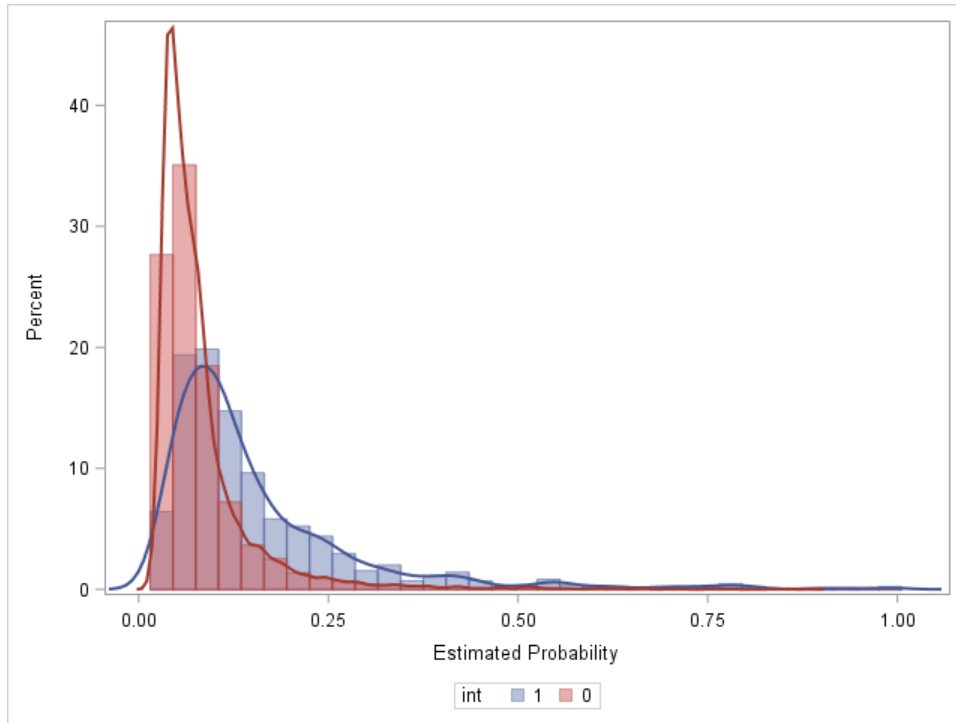
Balance before Matching



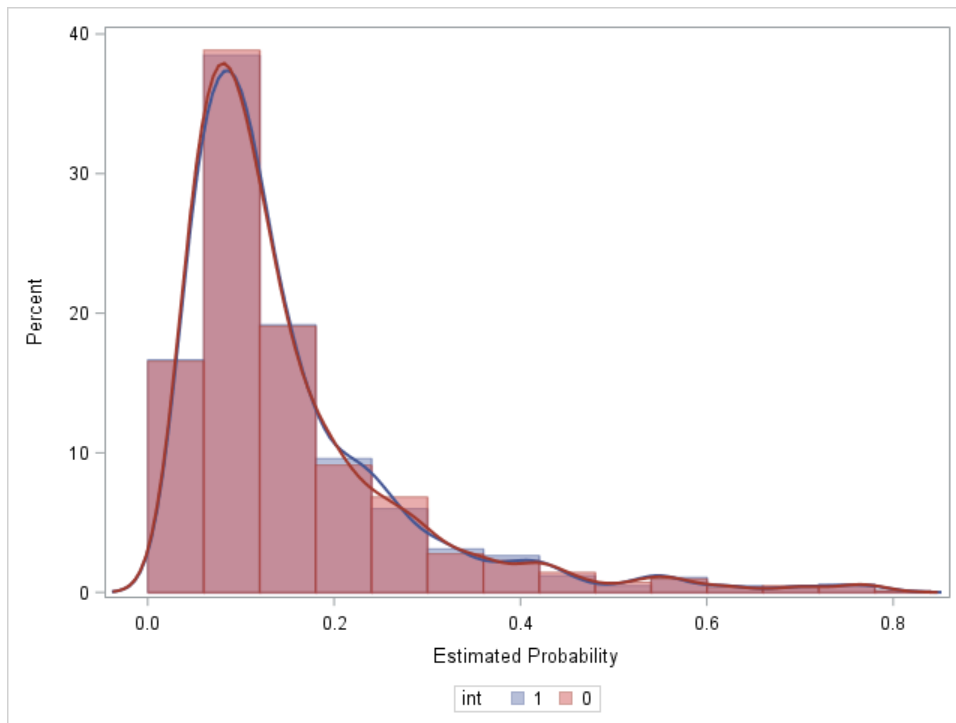
Balance after Matching



### Common Support before Matching



### Common Support after Matching



**Exhibit A.2:** Standardized differences for covariates before and after propensity score matching

Covariates used in match:	ACT: Standardized Difference before Matching	ACT: Standardized Difference after Matching
Age 18 to 24	0.1343	-0.0121
Age 25 to 34	0.1521	-0.0311
Age 35 to 44	-0.1193	0.0179
Age 45 to 54	-0.0215	-0.0109
Age 55 to 64	-0.0766	0.0326
Age greater than or equal to 65	-0.1037	0.0132
Age as a continuous variable	0.3680	-0.0781
Gender	-0.0056	0.0320
English as primary language	-0.0042	-0.0200
Spanish as primary language	0.0106	-0.0246
Other language as primary language	0.0069	0.0242
Race – African American	-0.0746	0.0072
Race – White	0.0479	0.0045
Ethnicity – Hispanic	0.0428	0.0000
Race – American Indian or Alaskan Native	0.0160	0.0000
Race – Asian or Pacific Islander	0.0330	-0.0256
Race – Other or Unknown	-0.1270	0.0246
Dual Eligibility	-0.2189	0.0042
Average quarterly CDPS Risk Score in the period prior to program enrollment	0.5569	0.0340
Average quarterly total cost of care in the period prior to program enrollment	0.6848	0.0676

**Study Design**

**Difference-in-Differences (DiD) Models**

We use DiD methods to analyze program effectiveness. The DiD models the difference in average outcome between the intervention and comparison group after implementation of the program minus the difference in average outcome between the intervention and comparison group before implementation of the intervention. This design allows us to estimate the treatment effect of the program while limiting the influence of selection bias (by using treatment and comparison groups pre- and post-intervention) and secular trends (by analyzing differences between two groups over the same period). Implementing a DiD design requires both a comparison group and pre- and post-intervention data.

For all analyses, we adjusted our DiD models for the following covariates: race/ethnicity, age, gender, English as primary language, dual eligibility, CDPS risk score, and a flag for a full quarter of enrollment.

For utilization outcomes, we employed a population averaged Poisson model. For cost outcomes, we employed a generalized liner model (GEE) with log link function. All models except those for inpatient



costs and behavioral health facility costs used a gamma distribution. The distributions of inpatient costs and behavioral health facility costs were skewed by a large number of zero dollar values therefore we applied a Gaussian distribution to those models.

All cost and utilization was considered zero if the value was missing in a claim for an individual with Medicaid eligibility. Prior to modeling, all cost variables were adjusted for inflation to 2017 numbers using the Producer Price Index (PPI) for General Medical and Surgical Hospitals.

Results for each step in the DiD model, for both adjusted and unadjusted models, are shown in Exhibit A.3 and A.4.

## Limitations

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There were several limitations to this study. Below, we list the limitations, their implications, and mitigation strategies, if any.

**Precise date of enrollment in ACT is unavailable.** Mercy Maricopa provided monthly roster files that listed Mercy Maricopa members receiving ACT services. The post-period includes the first complete calendar quarter and all other calendar quarters occurring after the enrollment month. Any immediate impact (i.e., impact occurring within one to two months of enrollment) on health care costs and quality of care may not be reflected in the findings.

**A significant number of members receiving ACT services were excluded from the analysis due to missing data.** Of the 2,143 members listed in the ACT roster files, only 841 members had a valid or non-missing identification or demographic information, which is required for linking to Medicaid claims and performing the analysis. As a result of this exclusion, we are unable to estimate the impact of ACT services for all the members who received any ACT services.

**Members receiving ACT services immediately after becoming eligible for the SMI program were excluded from the analysis.** To be included, members needed at least one quarter of enrollment in Mercy Maricopa in the periods before and after intervention enrollment. The data provided began in April 2014, when Mercy Maricopa became the RBHA. Members who started receiving ACT services immediately after (i.e., within one quarter) becoming eligible for the SMI integrated program were excluded from the analysis because we were unable to establish baseline cost and utilization levels due to limited pre-period.

**Level of need for ACT services for members in the comparison group is unavailable.** Due to unavailability of data, the level of need for members in the comparison group is not measured. As a result,

we were unable to account for differences in level of need for ACT services between members receiving ACT services and the matched comparison group. However, our propensity score matching methods did account for differences in illness burden<sup>14</sup> and prior year cost of care – measures that were meant to account for differences in level of risk, and total cost of care in the pre-period. However, we were unable to compare members in the ACT program with a comparison group that had a similar level of need for those services; the information contained in the data files did not allow for a comprehensive match on variables that may assess level of need.

**The Difference-in-Differences (DiD) analysis of some outcome measures did not meet the parallel trends assumption.** The DiD analysis, which compares change in outcomes of the ACT group to a matched comparison group, rests on the assumption that trends in the pre-period are parallel. Parallel trends are ones with similar relative changes over the entire study period, regardless of the starting point. When trends are not parallel over time, it can be assumed that something other than exposure to the program is affecting the difference in outcome. Although most outcome measures in this study met this parallel trends assumption, the following measures did not: number of ED visits; total cost of inpatient care; and total cost of behavioral health services. Pre-period trends for these outcomes for the ACT group and the matched comparison group were not parallel, implying that outcomes for both groups are not affected in the same manner over time. To address this, our models use aggregate pre and post periods rather than individual calendar-quarters. The model, as specified, compares average outcomes aggregated across pre and post-period quarters for the treatment and comparison group. Therefore, the threat to internal validity arising from differential trends across quarters in the pre-period between the treatment and comparison groups is less of a concern.

**Exhibit A.3: Cohort Specific Unadjusted Means**

Assertive Community Treatment Quality Measures

	Intervention PRE	Intervention POST	Intervention Difference	Comparison PRE	Comparison POST	Comparison Difference	DiD result
<b>Number of Inpatient Medical Hospitalizations</b> (per 1,000 members per quarter)	106	98	-8 -7.5%	187	132	-55 -29.4%	47
<b>Number of Inpatient Psychiatric Hospitalizations</b> (per 1,000 members per quarter)	547	513	-34 -6.2%	444	332	-112 -25.2%	78

<sup>14</sup> Chronic Illness and Disability Payment System (CDPS)—a diagnosis and pharmacy based risk adjustment model—was used to account for differences in illness burden across treatment and comparison groups.

<b>Number of Outpatient ED Hospitalizations</b> (per 1,000 members per quarter)	1572	1455	-117 -7.4%	1257	1257	0 0%	-117
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Assertive Community Treatment Cost Measures

	Intervention PRE (\$)	Intervention POST (\$)	Intervention Difference (\$)	Comparison PRE (\$)	Comparison POST (\$)	Comparison Difference (\$)	DiD result (\$)
<b>Total Cost of Care</b> (facility, professional services, pharmacy)	16297	15477	-820 -5%	15702	14905	-797 -5.1%	-23
<b>All Facility Costs</b>	6056	5676	-380 -6.3%	6114	5355	-759 -12.4%	379
Facility cost: Physical health only	1591	1480	-111 -7.0%	2527	2305	-222 -8.8%	111
Facility cost: Behavioral health only	4465	4196	-269 -6.0%	3587	3051	-536 -14.9%	267
<b>Inpatient Facility Cost</b>	1809	1358	-451 -24.9%	1834	1289	-545 -29.7%	94
<b>Professional Services Costs</b>	8371	7683	-688 -8.2%	8204	7923	-281 -3.4%	-407
Professional Services cost: Physical health only	1072	958	-114 -10.6%	1346	1396	50 3.7%	-164
Professional Services cost: Behavioral health only	7298	6725	-573 -7.9%	6857	6526	-331 -4.8%	-242
<b>Pharmacy Costs</b>	1870	2118	248 13.3%	1385	1627	242 17.5%	6
<b>Total Physical Health Costs</b> (Facility and Professional Services)	2663	2438	-225 -8.4%	3873	3701	-172 -4.4%	-53
<b>Total Behavioral Health Costs</b> (Facility and Professional Services)	11764	10921	-843 -7.2%	10444	9577	-867 -8.3%	24

Exhibit A.4: Cohort Specific Adjusted Results

Assertive Community Treatment Quality Measures

	Intervention PRE	Intervention POST	Intervention Difference	Comparison PRE	Comparison POST	Comparison Difference	DiD result
<b>Number of Inpatient Medical Hospitalizations</b> (per 1,000 members per quarter)	104 [ 93, 115]	99 [79, 119]	-5 [-25, 15] -5%	177 [150, 204]	132 [116, 148]	-45 [-71, -19] -25%	40 [8, 72]
<b>Number of Inpatient Psychiatric Hospitalizations</b> (per 1,000 members per quarter)	639 [600, 678]	587 [537, 637]	-53 [-89, -17] -8%	438 [387, 489]	388 [345, 431]	-50 [-84, -16] -11%	-2 [-52, 48]
<b>Number of Outpatient ED Hospitalizations</b> (per 1,000 members per quarter)	1589 [1491, 1687]	1459 [1327, 1591]	-130 [-257, -3] -8%	1133 [1038, 1228]	1189 [1078, 1300]	56 [-48, 160] 5%	-187 [-352, -22]

Note: Bolded numbers represent a statistically significant finding. The numbers in parenthesis represent the 90% confidence intervals.

Assertive Community Treatment Cost Measures

	Intervention PRE (\$)	Intervention POST (\$)	Intervention Difference (\$)	Comparison PRE (\$)	Comparison POST (\$)	Comparison Difference (\$)	DiD result (\$)
<b>Total Cost of Care</b> (facility, professional services, pharmacy)	16059 [15485, 16633]	15324 [14511, 16137]	-734 [-1483, 15] -5%	15456 [14580, 16332]	14908 [14065, 15751]	-548 [-1272, 176] -4%	-\$187 [-1222, 848]
<b>All Facility Costs</b>	5740 [5397, 6083]	5132 [4585, 5679]	<b>-608</b> [-1160, -56] <b>-11%</b>	5864 [5293, 6435]	5369 [4961, 5777]	-494 [-1169, 181] -8%	-\$114 [-988, 760]
Facility cost: Physical health only	1516 [1369, 1663]	1456 [1242, 1670]	-60 [-262, 142] -4%	2348 [2073, 2623]	2095 [1827, 2363]	-253 [-562, 56] -11%	\$193 [-176, 562]
Facility cost: Behavioral health only	4637 [4331, 4943]	4404 [3829, 4979]	-233 [-802, 336] -5%	3167 [2836, 3498]	3459 [3027, 3891]	292 [-185, 769] 9%	-\$526 [-1268, 216]
<b>Inpatient Facility Cost</b>	1733 [1522, 1944]	1438 [1083, 1793]	-295 [-665, 75] -17%	1506 [1272, 1740]	1479 [1133, 1825]	-27 [-420, 366] -2%	-\$269 [-807, 269]
<b>Professional Services Costs</b>	7964 [7629, 8299]	7479 [7085, 7873]	<b>-485</b> [-810, -160] <b>-6%</b>	7788 [7216, 8360]	7306 [6773, 7839]	<b>-482</b> [-862, -102] <b>-6%</b>	-\$3 [-502, 496]
Professional Services cost: Physical health only	1007 [927, 1087]	950 [839, 1061]	-57 [-149, 35] -6%	1197 [1073, 1321]	1209 [1104, 1314]	12 [-92, 116] 1%	-\$69 [-207, 69]
Professional Services cost: Behavioral health only	6969 [6644, 7294]	6558 [6182, 6934]	<b>-410</b> [-722, -98] <b>-6%</b>	6501 [5945, 7057]	6015 [5497, 6533]	<b>-486</b> [-849, -123] <b>-7%</b>	\$76 [-401, 553]
<b>Pharmacy Costs</b>	1833 [1700, 1966]	2079 [1848, 2310]	<b>246</b> [25, 467] <b>13%</b>	1322 [1128, 1516]	1506 [1332, 1680]	185 [-26, 396] 14%	\$61 [-244, 366]
<b>Total Physical Health Costs</b> (Facility and Professional Services)	2507 [2297, 2717]	2395 [2106, 2684]	-112 [-374, 150] -4%	3480 [3136, 3824]	3294 [2967, 3621]	-186 [-556, 184] -5%	\$74 [-379, 526]
<b>Total Behavioral Health Costs</b> (Facility and Professional Services)	12008 [11454, 12562]	11200 [10442, 11958]	<b>-808</b> [-1486, -130] <b>-7%</b>	11453 [10541, 12365]	10826 [9927, 11725]	-627 [-1288, 34] -5%	-\$181 [-1123, 761]

Note: Bolded numbers represent a statistically significant finding. The numbers in parenthesis represent the 90% confidence intervals.

## Appendix B: Qualitative Codebook

Code Family	Code	Definition/Clarification
Service type	Care integration	References to integrated services or other supportive or medical services in tandem
	Court services	References to court services
	Employment	References to employment services
	Housing	References to housing services
	Government (city, county, state)	Code entire interview to ID who was interviewee
	Mercy Maricopa staff	Code entire interview to ID who was interviewee
	Service providers	Code entire interview to ID who was interviewee
	Stakeholders (community advocate)	Code entire interview to ID who was interviewee
Background information	Background information	Descriptive information about programs and services or staff roles. Information should not be linked to an outcome or the development of the program.
Arnold v. Sarn	Arnold v. Sarn	Any information related to the Arnold v. Sarn legislative decision
Client stories	Client stories	Anecdotes about client experiences, may be cross-coded with Member Health care experiences
Outcomes	Cost	Descriptions of outcomes related to cost
	Member health care experience	Descriptions of outcomes related to the member health care experience
	Quality of care	Descriptions of outcomes related to quality of care
Program challenges and gaps	Program challenges and gaps	Challenges with the services related to outcomes
Program successes	Program successes	Successes with the services related to outcomes
Case study	Data	References to data used to make decisions about the program
	External factors	Any factors that influenced the expansion that came from outside Mercy Maricopa
	Internal factors	Any factors that influenced the expansion that came from within Mercy Maricopa
	Implementation challenges	Challenges in expanding the services
	Implementation successes	Successes in the expansion of services (but not outcomes)
	Stakeholders and roles	Organizations or individuals involved in the expansion
	Sustainability and replicability	Comments related to the ability to mimic the program elsewhere or maintain the program

## References

- <sup>i</sup> Bond GR, McGrew JH, Fakeete DM. (1995). Assertive outreach for frequent users of psychiatric hospitals: a meta-analysis. *Journal of Mental Health Administration*, 22(1): 4-16.
- <sup>ii</sup> Bedell JR, Cohen NL, Sullivan A. (2000). Case management: the current best practices and the next generation of innovation. *Community Mental Health Journal*, 36: 179-194.
- <sup>iii</sup> Rosenheck R, Neale M, Leaf P et al. (1995). Multisite experimental cost study of intensive psychiatric community care. *Schizophrenia Bulletin*, 21(1): 129-140.
- <sup>iv</sup> Coldwell C, Bender WS. (2007). The effectiveness of assertive community treatment for homeless populations with severe mental illness: a meta-analysis. *American Journal of Psychiatry*, 164(3): 393-399.
- <sup>v</sup> Nelson G, Aubry T, Lafrance A. (2007). A review of the literature on the effectiveness of housing and support, assertive community treatment, and intensive case management interventions for persons with mental illness who have been homeless. *American Journal of Orthopsychiatry*, 77(3): 350-361.
- <sup>vi</sup> Bond GR, Drake RE, Mueser KT, Latimer E. (2001). Assertive community treatment for people with severe mental illness, critical ingredients and impact on patients. *Disease Management & Health Outcomes*, 9(3): 141-159.
- <sup>vii</sup> Ibid.
- <sup>viii</sup> Substance Abuse and Mental Health Services Administration. (2016). Mental and Substance Use Disorders. <https://www.samhsa.gov/disorders>
- <sup>ix</sup> Rieke K, Smolsky A, Bock E, Erkes L, Watanabe-Galloway S. (2015). Mental and nonmental health hospital admissions among chronically homeless adults before and after supportive housing placement. *Social Work in Public Health*, vol. 30. <http://eds.b.ebscohost.com.proxy.uchicago.edu/eds/pdfviewer/pdfviewer?vid=3&sid=dff2cba9-cb76-4592-a89d-f675bb5e93bf%40sessionmgr101>
- <sup>x</sup> Taylor LA, Tan AX, Coyle CE, Ndumele C, Rogan E, Canavan M et al. (2016). Leveraging the social determinants of health: what works? *PLoS ONE*, 11(8): e0160217. doi:10.1371/journal.pone.0160217
- Patterson M, Moniruzzaman A, Palepu A et al. (2013). Housing First improves subjective quality of life among homeless adults with mental illness: 12-month findings from a randomized controlled trial in Vancouver, British Columbia. *Social Psychiatry and Psychiatric Epidemiology*, 48(1245). doi:10.1007/s00127-013-0719-6
- Kinoshita Y, Furukawa TA, Kinoshita K, Honyashiki M, Omori IM, Marshall M, Bond GR, Huxley P, Amano N, Kingdon D. (2013). Supported employment for adults with severe mental illness. *Cochrane Database of Systematic Reviews*, (9). Art. No.: CD008297. doi: 10.1002/14651858.CD008297.pub2
- Hoffmann H, Jackel D, Glauser S, Mueser KT, Kupper Z. (2014). Long-term effectiveness of supported employment: 5-year follow-up of a randomized controlled trial. *American Journal of Psychiatry*, 171(11). <http://dx.doi.org/10.1176/appi.ajp.2014.13070857>

World Health Organization. (2010). International Workshop on Housing, Health, and Climate Change: Developing Guidance for Health Protection in the Built Environment – Mitigation and Adaptation Response: Meeting Report. [http://www.who.int/hia/house\\_report.pdf?ua=1](http://www.who.int/hia/house_report.pdf?ua=1)

Paradise J, Ross DC. (2017). Linking Medicaid and Supportive Housing: Opportunities and on-the-Ground Examples. Henry J. Kaiser Family Foundation. <http://www.kff.org/medicaid/issue-brief/linking-medicaid-and-supportive-housing-opportunities-and-on-the-ground-examples/>

Buchanan, WR et al. (2010). Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS Behavior*, 14(3). <https://www.ncbi.nlm.nih.gov/pubmed/19949848>

Martinez T, Burt M. (2006). Impact of permanent supportive housing on the use of acute care health services by homeless adults. *Psychiatric Services*, 57(7). <https://www.ncbi.nlm.nih.gov/pubmed/16816284>

Sadowski L et al. (2009). Effect of a housing and case management program on emergency department visits and hospitalizations among chronically ill homeless adults. *Journal of the American Medical Association*, 301(17). <https://www.ncbi.nlm.nih.gov/pubmed/19417194>

Massachusetts Housing and Shelter Alliance. (2016). *Home & Healthy for Good – Permanent Supportive Housing: A Solution-Driven Model*. Home and Health for Good Progress Report.

<sup>xi</sup> Ibid.

<sup>xii</sup> U.S. Department of Housing and Urban Development Office of Community Planning and Development. (2010). *2010 Annual Homeless Assessment Report to Congress*. <https://www.hudexchange.info/resources/documents/2010HomelessAssessmentReport.pdf>.

<sup>xiii</sup> Glaze LE, James DJ. (2006). *Mental Health Problems of Prison and Jail Inmates*. Bureau of Justice Statistics Special Report. <https://www.bjs.gov/content/pub/pdf/mhppji.pdf>.

<sup>xiv</sup> Colton CW, Manderscheid RW. (2006). Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Preventing Chronic Disease: Public Health Research, Practice and Policy*, 3(2): 1-14. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1563985/>.

<sup>xv</sup> National Association of State Mental Health Program Directors Council. (2006). *Morbidity and Mortality in People with Serious Mental Illness*. <https://www.nasmhpd.org/sites/default/files/Mortality%20and%20Morbidity%20Final%20Report%208.18.08.pdf>

<sup>xvi</sup> Insel TR. (2008). Assessing the economic costs of serious mental illness. *American Journal of Psychiatry*, 165(6): 663-665. <http://ajp.psychiatryonline.org/doi/abs/10.1176/appi.ajp.2008.08030366>

<sup>xvii</sup> Arizona Health Care Cost Containment System. (2013). New Maricopa County Regional Behavioral Health Authority. [https://www.azahcccs.gov/Resources/Downloads/1115Waiver/maricopaCountyRbha\\_factsheet.pdf](https://www.azahcccs.gov/Resources/Downloads/1115Waiver/maricopaCountyRbha_factsheet.pdf)

<sup>xviii</sup> Arizona Health Care Cost Containment System. (2017). *Arnold v. Sam*. <https://www.azahcccs.gov/AHCCCS/HealthcareAdvocacy/arnoldvsarn.html>



xix Ibid.

xix Substance Abuse and Mental Health Services Administration.

xx Mercy Maricopa Integrated Care. (2017). *Assertive Community Treatment (ACT) Operational Manual*. <https://www.mercymaricopa.org/assets/pdf/providers/manuals/ACT-Operational-Manual-20170622.pdf>

xxi Stein L, Test M. (1980). Alternative to mental hospital treatment: conceptual model, treatment program, and clinical evaluation. *Archives of General Psychiatry*, 37: 400-405.

xxii Essock S, Frisman L, Kontos N. (1998). Cost-effectiveness of assertive community treatment teams. *American Journal of Orthopsychiatry*, 68: 179-190.

xxiii Bond GR, Miller LD, Krumwied RD, Ward RS. (1988). Assertive case management in three CMHCs: a controlled study. *Hospital & Community Psychiatry*, 39: 411-418.

xxiv Bond GR, Witheridge TF, Dincin J, Wasmer D, Webb J, De Graaf-Kaser R. (1990). Assertive community treatment for frequent users of psychiatric hospitals in a large city: a controlled study. *American Journal of Community Psychology*, 18: 865-891.

xxv Ibid.

xxvi Latimer E. (1999). Economic impacts of assertive community treatment: a review of the literature. *Canadian Journal of Psychiatry*, 44: 443-54.

xxvii Latimer E. (2005). Economic considerations associated with assertive community treatment and supported employment for people with severe mental illness. *Journal of Psychiatry and Neuroscience*, 30(5): 355-359.

xxviii Bond GR, McGrew JH, Fakete DM. (1995). Assertive outreach for frequent users of psychiatric hospitals: a meta-analysis. *Journal of Mental Health Administration*, 22(1): 4-16.

xxix Bedell JR, Cohen NL, Sullivan A. (2000). Case management: the current best practices and the next generation of innovation. *Community Mental Health Journal*, 36: 179-194.

xxx Rosenheck R, Neale M, Leaf P et al. (1995). Multisite experimental cost study of intensive psychiatric community care. *Schizophrenia Bulletin*, 21: 129-140.

xxxi City of Tucson. (2017). Crime Free Multi-Housing. <https://www.tucsonaz.gov/police/crime-free-multi-housing>

xxxii Kleinman R. (2017). State strategies for coordinating Medicaid and housing services. *Psychiatric Rehabilitation Journal*, 40(2). <https://www.mathematica-mpr.com/our-publications-and-findings/publications/state-strategies-for-coordinating-medicaid-and-housing-services>

xxxiii Bond GR, McGrew JH, Fakete DM. (1995). Assertive outreach for frequent users of psychiatric hospitals: a meta-analysis. *Journal of Mental Health Administration*, 22(1): 4-16.

Bedell JR, Cohen NL, Sullivan A. (2000). Case management: the current best practices and the next generation of innovation. *Community Mental Health Journal*, 36: 179-194.

Rosenheck R, Neale M, Leaf P et al. (1995). Multisite experimental cost study of intensive psychiatric community care. *Schizophrenia Bulletin*, 21: 129-140.

Coldwell C, Bender WS. (2007). The effectiveness of assertive community treatment for homeless populations with severe mental illness: a meta-analysis. *American Journal of Psychiatry*, 164(3): 393-399.

Nelson G, Aubry T, Lafrance AA. (2007). Review of the literature on the effectiveness of housing and support, assertive community treatment, and intensive case management interventions for persons with mental illness who have been homeless. *American Journal of Orthopsychiatry*, 77(3): 350-361.