The Colorado Regional Integrated Care Collaborative

Managing Health Care for Medicaid Recipients with Disabilities: Final Report on the Colorado Access Coordinated Care Pilot Program

Charles Michalopoulos
Michelle Manno
Sue E. Kim
Anne Warren

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BUILDING KNOWLEDGE TO IMPROVE SOCIAL POLICY

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Overview

Coordinated care programs are designed to address problems that can arise when individuals with multiple chronic conditions seek health care. Their health care needs might require attention from several doctors, which can result in duplicative tests or prescriptions for contraindicated medications. Coordinated care programs attempt to minimize these problems by using care managers to assess individuals' health care needs and help them make appropriate use of the health care system. Such programs may be an important policy option for aged and disabled Medicaid recipients, who account for almost 75 percent of Medicaid spending.

This report presents two-year results from an MDRC evaluation of a pilot coordinated care program run by Colorado Access, a nonprofit health plan. As part of this program, Colorado Access care managers' goals included encouraging individuals to see their primary care providers, assessing health care and social service needs, providing educational information about medical conditions, coordinating care across providers, and helping individuals make and keep medical appointments. The program aimed to improve the quality of care while reducing Medicaid costs by helping individuals use appropriate care that would reduce hospital admissions and emergency department visits.

To understand whether the Colorado Access program had effects, more than 5,000 blind or disabled Medicaid recipients in five Denver-area counties were assigned at random to either a program group, which had access to the coordinated care program, or a control group, which did not. In total, 3,540 people were assigned to the program group and 1,524 were assigned to the control group.

Key Findings

- **Care managers faced several challenges implementing the program.** Because many clients were difficult to reach (as a result of nonworking telephone numbers or a change of address without notification, for example), care managers had trouble contacting them and engaging them in services, and faced large caseloads that precluded frequent contact with most individuals.

- **The program had little effect on health care use.** The frequency of doctor visits, hospital admissions, emergency room visits, and use of prescription medications was similar for the program group and the control group. The program did increase the use of providers who are not medical doctors, such as optometrists and podiatrists.

- **Results from more effective coordinated care programs suggest several ways to improve the design of the program.** More effective programs have used in-person contact, targeted individuals at high risk of hospitalization, and focused on managing transitions from hospital to home. By contrast, Colorado Access care management took place primarily by telephone, included a broad cross-section of Medicaid recipients with disabilities, and had limited information on hospital admissions.

Although these results suggest that the program had little effect, it is possible that the effects would have increased after the second year. Furthermore, the quality of care, the use of social services, and patients' satisfaction with care were not measured in this evaluation, so the program's effects on those outcomes are unknown.

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Preface

One of the nation's most pressing policy questions is how to diminish the rate of increase in health care costs. Skyrocketing costs take a larger and larger share of the income of the middle class, make it more difficult for American corporations to compete internationally, and threaten the solvency of federal and state governments. Between 2004 and 2011, for example, the share of the federal budget allocated to Medicare and Medicaid — the two major public health insurance programs in the United States — increased from 19 to 23 percent.

Within the Medicaid system, which provides health care benefits to low-income individuals, any attempt to reduce health care costs must address the health care needs of the elderly and individuals with disabilities, a group that accounts for only 25 percent of Medicaid recipients but almost 75 percent of Medicaid spending. Many individuals in this high-needs group face multiple chronic conditions, such as diabetes and cardiovascular disease. These illnesses may result in the use of expensive prescription medications or frequent trips to the hospital emergency room, and disregarding doctors' recommendations may result in worsened conditions that require expensive hospital admissions.

One promising idea for helping this high-needs group is to coordinate their care. By making sure that each individual has access to preventive care and by helping individuals use that care, coordinated care programs can help keep chronic conditions from deteriorating, requiring emergency room visits or expensive hospital care. Keeping track of who makes frequent use of the emergency room may also help to identify individuals who are in particular need of preventive care. In addition, by looking at care received from various health care providers, coordinated care programs can uncover and reduce duplicative care.

Many states have some form of coordinated care for Medicaid recipients, but few rigorous studies have been conducted on the effects of such care. This report helps to fill the gap by presenting results from a pilot coordinated care program that was recently operated in the Denver area by the nonprofit health plan Colorado Access. Conceived by the Colorado Department of Health Care Policy and Financing along with the Center for Health Care Strategies, the evaluation of the Colorado Access pilot included more than 5,000 Medicaid recipients with disabilities, some of whom were assigned at random to be eligible for the Colorado Access coordinated care program. While the program had little impact on participants' health care use, which was its goal, the results from the evaluation provide unusually rigorous information about the effects of a typical program that may help in designing more effective services in the future.

Gordon L. Berlin
President, MDRC

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The Authors

Executive Summary

Coordinated care programs are designed to address and circumvent problems that can arise when individuals with multiple chronic conditions seek health care. Their health care needs might require the attention of several specialists, which can result in duplicative tests or prescriptions for contraindicated medications, especially if they don't have a primary care provider or their primary care provider is not keeping track of their overall health care use or needs. Lack of primary care might also mean that some chronic conditions remain undetected, which might require the patient to seek emergency care or be admitted to the hospital, increasing health care costs. Coordinated care programs attempt to minimize these problems by using care managers to assess individuals' health care needs and help them make appropriate use of the health care system before a medical emergency occurs. Such programs may represent an important policy tool for aged and disabled Medicaid recipients, who account for about 25 percent of the Medicaid population but almost 75 percent of Medicaid spending.[1]

This report presents results through two years from an evaluation conducted by MDRC of a pilot coordinated care program run by Colorado Access, a nonprofit health plan that operates in the Denver area. The program is part of the Colorado Regional Integrated Care Collaborative (CRICC). As part of this program, Colorado Access made sure that each individual had a primary care provider, who was intended to be the individual's first contact for care and to have some responsibility for ensuring that the individual's health care needs were being addressed. Care managers sought to undertake a number of activities, mostly by telephone. An early goal was to assess each individual's health care needs and social service needs. These assessments were used to develop goals related to health care (such as reducing emergency department use) and social service needs (such as arranging for transportation to a doctor or helping the individual find stable housing). The assessments also helped care managers determine whether individuals had chronic health conditions that were not being addressed or that needed monitoring. Based on the health assessment, care managers scheduled more frequent calls with individuals with moderate to high medical costs who had chronic conditions that would benefit from coordinated care and less frequent calls with those whose care needs were being met or who had fewer care needs. Depending on an individual's needs, care managers provided educational information on medical conditions, coordinated care across providers, and helped individuals use the health care system (for example, by making appointments for them and escorting them to those appointments).

[1]Vladeck (2003).

To understand whether the Colorado Access program had effects on health care use, the evaluation used a random assignment design. Between April 2008 and May 2009, all eligible blind or disabled Medicaid recipients in five Denver-area counties were assigned at random to a program group, which had access to the coordinated care program, or to a control group, which did not have access to coordinated care. In total, 5,064 people were randomly assigned, with 70 percent (3,540) assigned to the program group and 30 percent (1,524) assigned to the control group. Random assignment ensures that the program and control groups were similar in all respects when they entered the study. Comparing subsequent outcomes for the two groups, therefore, provides reliable estimates of the effects of being assigned to the program group.

Program group members were sent a letter telling them they had been assigned to Medicaid managed care and asking them to choose one of three managed care programs — Colorado Access, Denver Health, or the Primary Care Physician Program — or to choose to remain in traditional fee-for-service Medicaid. Individuals who did not make a choice by the end of the month were automatically (that is, "passively") enrolled in the Colorado Access managed care program. After three months, Colorado Access staff attempted to recruit their managed care enrollees into coordinated care services, which were available for up to two years. Control group members remained in the fee-for-service system without coordinated care services for the two years of the evaluation.

Using data on health care use provided by the Colorado Department of Health Care Policy and Financing (HCPF) and Colorado Access, this report estimates the effects of passive enrollment into the Colorado Access program on health care use. The results so far provide little evidence that the program systematically altered health care use among study participants. (See Table ES.1 for the estimated impacts of passive enrollment into the Colorado Access program on key outcomes across the two-year study period.) Through two years, the frequency of doctor visits, hospital admissions and readmissions, emergency department visits, and use of prescription medications were similar for the program group and control group. However, the program did increase the use of providers other than medical doctors, such as optometrists and podiatrists. It is possible that coordinated care affected other outcomes, including health and social service use, especially in light of the fact that care managers tried to help individuals take care of social service needs. However, information about those outcomes was not available to the study team and therefore they were not included in the evaluation, which focuses solely on health care use through Medicaid.

A comparison of the Colorado Access program with several successful coordinated care interventions suggests some ways in which a future program might be made more effective.[2]

[2]Brown (2009); Brown et al. (2007); Chen et al. (2008); Peikes, Chen, Schore, and Brown (2009).

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Table ES.1

Estimated Impacts of CRICC Pilot, Months 1-24 After Month of Passive Enrollment

Outcome	Program Group	Control Group	Difference (Impact)	
Use of outpatient services (%)				
Any type of visit with a primary care provider	73.0	73.9	-0.9	
Nonphysician visit	24.0	19.5	4.5	***
Specialist visit	69.9	70.2	-0.3	
Hospital admissions and emergency department use (%)				
Ever admitted to a hospital	23.3	23.0	0.3	
Readmitted within 30 days	5.2	4.8	0.4	
Ever used an emergency department	52.8	51.9	0.9	
Filling prescription medications (%)				
Filled any prescription medication	80.2	79.8	0.4	
Sample size (total = 5,064)	3,540	1,524		

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows:
*** = 1 percent, ** = 5 percent, * = 10 percent.

First, most contact between Colorado Access care managers and enrollees was by telephone, while more effective programs use frequent in-person contact. In addition, care manager caseloads were quite high, resulting in less frequent contact between care managers and enrollees than has been seen in more successful programs. Second, several effective programs have targeted individuals at high risk of hospitalization, but Colorado included a broad cross-section of Medicaid beneficiaries with disabilities in the CRICC pilots. Third, the ability to manage transitions from hospital to home has been found to be effective in other studies, but Colorado Access care managers had limited information about hospital admissions during much of the program period. Finally, Colorado Access care managers had difficulty enrolling individuals into coordinated care because of bad contact information and the reliance on contact by telephone. More resources devoted to engagement might have allowed the program to include more individuals who would have benefited from the intervention.

Two additional reports on related pilots will be released later in 2013: one on another CRICC pilot program in Colorado, the Kaiser Permanente Coordinated Care Pilot Program, and one on the Chronic Illness Demonstration Project, which provided coordinated care for high-needs Medicaid recipients in New York's fee-for-service system.

Introduction

Coordinated care programs are designed to address and circumvent problems that can arise when individuals with multiple chronic conditions seek health care. Such individuals might need to see several specialists, which can result in duplicative tests or prescriptions for contraindicated medications, especially if they don't have a primary care provider (PCP) or their PCP is not keeping track of their overall health care use or needs. In addition, complications from undetected conditions might necessitate emergency care or hospitalization, increasing health care costs. Coordinated care programs attempt to minimize these problems by using care managers to assess individuals' health care needs and help them make appropriate use of the health care system before a medical emergency occurs. Such programs may be an important policy tool for aged and disabled Medicaid recipients, who account for about 25 percent of Medicaid recipients but almost 75 percent of Medicaid spending. [1] To date, more than 20 states have introduced coordinated care programs for Medicaid recipients.

This report presents results through two years from an MDRC evaluation of a pilot coordinated care program run by Colorado Access, a nonprofit health plan that operates in the Denver area. This pilot program and a similar program run by Kaiser Permanente Colorado are part of the Colorado Regional Integrated Care Collaborative (CRICC), which was a multiyear partnership of the Colorado Department of Health Care Policy and Financing (HCPF), the Center for Health Care Strategies (CHCS), local health plans and providers, and other stakeholders that was created to improve care for high-needs Medicaid recipients. CRICC is part of the four-state Rethinking Care Program (RTC) developed by CHCS to design and test care management interventions for high-needs Medicaid recipients. In addition to Colorado, RTC included pilots in New York (also being evaluated by MDRC), Pennsylvania, and Washington.

The Colorado Access program sought to increase the use of preventive care and to uncover unmet medical needs in order to reduce the need for hospital admissions and the use of emergency department (ED) care. To understand whether the Colorado Access program changed health care use, the evaluation used a rigorous random assignment design. Between April 2008 and May 2009, more than 5,000 blind or disabled Medicaid recipients were randomly assigned to a program group that had access to the coordinated care program, or to a control group that did not have access to the program.

The MDRC evaluation included two components. An impact analysis estimated the effects of the program on different types of health care provided through the Medicaid system, while an implementation study sought to understand the design of the program and how it operated. Results through two years showed few effects on doctor visits, hospital admissions,

[1] Vladeck (2003).

emergency department visits, or filling prescription medications. The implementation study suggests some reasons why the program may have had few effects. In particular, care managers struggled to engage individuals in coordinated care services and faced high caseloads that limited their ability to provide intensive services. In addition, most care management was provided by telephone, while recent research suggests that intensive in-person contact may be needed in order for care coordination to be effective.[2]

The remainder of this report summarizes the research on coordinated care programs, describes the study design and study sample, describes the Colorado Access CRICC program, and presents the estimated effects of the program.

[2]Brown (2009).

Background on Coordinated Care Programs

Coordinated care programs are intended to increase appropriate use of medical care while reducing unnecessary emergency department visits, hospital admissions, and other medical services. To meet patients' needs, care managers — who are usually nurses or master's level clinicians — undertake a number of activities. They may encourage patients to seek proper treatment, help them make appointments with health care professionals, make sure they keep appointments and take prescribed medications, and educate them about treatment effectiveness.[3] Effective care managers will also address patients' social service needs, such as those related to unstable housing or concerns about being able to buy enough food. Care managers may also work directly with primary care providers, giving them information that is designed to help them monitor a patient's overall health care use and communicate with other health care providers.

Many states have some form of coordinated care for Medicaid recipients, but the interventions differ with regard to what coordinated care means and who is targeted.[4] For example, Illinois uses nurses, social workers, behavioral health workers, and clinic-based staff to provide care management to adults with disabilities and children with persistent asthma.[5] Oklahoma provides patient education and care management services to recipients of Temporary Assistance for Needy Families and aged, blind, and disabled Medicaid recipients.[6] Iowa, Kansas, New Hampshire, Rhode Island, Texas, Virginia, Washington, and Wyoming provide care management via telephone and education materials to Medicaid recipients with chronic illnesses such as asthma, diabetes, and congestive heart failure.[7] North Carolina uses a system of local networks of providers to support and manage high-cost, high-risk Medicaid recipients.[8]

Although several of these state coordinated care programs have been studied, most of those studies have not used the most rigorous statistical methods, leading to questions about the validity of their results. For example, a study in Oregon found that disease management via telephone for Medicaid recipients with asthma decreased emergency department visits and increased office visits. However, that study compared outcomes for a group of Medicaid recipients before and after they were part of the disease management program. Because it did not have a comparison group of individuals who did not receive the program, it is unclear how much of the change over time was a result of the program and how much would have happened

[3]Rittenhouse and Robinson (2006); Wagner et al. (2001).
[4]Arora et al. (2008).
[5]Saunders (2008).
[6]Arora et al. (2008).
[7]Arora et al. (2008).
[8]Arora et al. (2008); Community Care of North Carolina (2008).

even without the intervention.[9] A study of disease management for congestive heart failure, diabetes, asthma, and hypertension in Florida found improvement in a range of health behaviors and outcomes such as fewer hospital stays and emergency department visits,[10] but it compared people who volunteered with those who did not, and it is likely that volunteers differ from others in ways that would affect the results of the study.[11] In Virginia, a chronic disease management program for Medicaid recipients found decreased emergency department visits, hospital admissions, and physician office visits within the first two years.[12] However, that study compared those who received the intervention with a comparison group that had similar demographics and pre-intervention health care use, but it did not use random assignment to create the two groups. Although the program group and comparison group looked similar, such methods can only adjust for observed differences between the groups but cannot adjust for unobserved differences such as motivation or health care preferences.[13] In other contexts, such comparison groups have been found to produce unreliable estimates of the effects of social service programs.[14]

Two recent studies of coordinated care for Medicaid recipients have used a more rigorous, random assignment design. In Indiana, a chronic disease management program reduced Medicaid spending for individuals with congestive heart failure but not diabetes.[15] Random assignment was also used in the Rethinking Care pilot in Washington, mentioned on page 1.[16] This program focused on a subset of aged, blind, and disabled Medicaid recipients who exhibited evidence of mental illness or chemical dependency and who were identified as being at high risk of having future high medical expenses. A community-based, multidisciplinary care management team, led by registered nurses, used in-person and telephone support to enable clients to address their own health care needs and to enhance the coordination, communication, and integration of services across safety net providers (that is, providers who offer health services to low-income populations and others without health insurance). However, the intervention did not generally show statistically significant changes in health care use during the first two years — meaning that the changes that were observed were likely a result of chance rather than the program.

Randomized control trials have also been used to study coordinated care programs outside of the Medicaid system for severely ill patients with specific chronic conditions such as

[9]Linden, Berg, and Wadhwa (2007).
[10]Morisky et al. (2008); Afifi, Morisky, Kominski, and Kotlerman (2007).
[11]Bell, Orr, Blomquist, and Cain (1995).
[12]Zhang et al. (2008).
[13]Rosenbaum and Rubin (1983).
[14]Michalopoulos, Bloom, and Hill (2004).
[15]Holmes et al. (2008).
[16]Bell et al. (2012).

diabetes mellitus, asthma, depression, coronary artery disease, and congestive heart failure.[17] These studies have shown that such programs can improve health outcomes for patients with those conditions. For instance, studies have shown that coordinated care helps to control diabetes,[18] reduces problems from cardiovascular disease,[19] and reduces hospitalization for patients with congestive heart failure.[20] In addition, coordinated care has increased the use of preventive care, such as cancer screening,[21] and improved the overall health of the elderly while reducing their ED visits.[22] Coordinated care has encouraged patients with depression to talk to mental health specialists, increased their use of antidepressants, reduced their depression, and improved work performance and job retention.[23] Among Medicaid recipients, there is evidence that in-person care management is effective when it targets conditions such as diabetes, asthma, and congestive heart failure,[24] but less effective when targeting coronary artery disease.[25]

Although most rigorous studies of coordinated care have focused on individuals who are suffering from particular chronic conditions such as depression or diabetes, there is some evidence that broad-based programs can be effective. In particular, a randomized trial of telephone support for nearly 200,000 individuals insured through one of seven employers found evidence of reduced health care costs, primarily through reduced hospitalizations.[26]

Another source of positive findings for broader groups comes from the Medicare Coordinated Care Demonstration (MCCD), a random assignment study of 15 coordinated care programs for Medicare recipients.[27] Of the 15 programs included in MCCD, three included patients with a broad set of diagnoses while the remainder focused on either one or a small number of chronic conditions. The study found that the programs generally succeeded in providing health education but had few effects on individuals' overall satisfaction with care, adherence to care, health care use, or costs.[28]

Although the MCCD programs had few effects overall, three of the programs reduced hospital admissions and health care costs over a four-year period. Comparing these three

[17]Mattke, Seid, and Ma (2007); Wagner et al. (2001).
[18]Villagra and Ahmed (2004); Dorr et al. (2005); Chin et al. (2007); Glazier, Bajcar, Kennie, and Willson (2006); Sidorov et al. (2002).
[19]Harris et al. (2003); Sequist et al. (2006).
[20]Dewalt et al. (2006): Gorski and Johnson (2003).
[21]Dietrich et al. (2006); Dietrich et al. (2007).
[22]Counsell et al. (2007).
[23]Wang et al. (2007); Mohr et al. (2008).
[24]Arora et al. (2008); Warsi et al.(2004).
[25]Arora et al. (2008).
[26]Wennberg et al. (2010).
[27]Brown et al. (2007); Peikes, Chen, Schore, and Brown (2009); Chen et al. (2008).
[28]Peikes, Chen, Schore, and Brown (2009).

programs with the other twelve suggests that six structural and operational components influence the effectiveness of coordinated care for Medicare recipients:[29]

1. **Targeting.** Success is more likely when coordinated care targets patients at substantial risk of needing hospitalization in the coming year.

2. **In-person contact.** The most successful programs averaged nearly one in-person contact per month during the patient's first year in the program.

3. **Access to timely information about hospital and ED admissions.** Connecting with patients shortly after flare-ups of chronic conditions that require hospitalization or ED visits is critical to providing transitional care and avoiding readmissions.

4. **Close interaction between care managers and primary care providers.** Occasional face-to-face interaction with physicians and ensuring that all program patients who are seeing a particular physician are assigned to the same care manager creates a strong working relationship.

5. **Services provided.** The most successful programs assessed patients' needs, developed care plans, and coached patients on managing their conditions and taking medications properly. Successful programs were also more likely to provide social supports, such as help accessing resources like transportation and housing assistance.

6. **Staffing.** More successful programs relied primarily on registered nurses to deliver the bulk of the intervention, and the median case load was 70. The role of social workers is important but it is unclear whether they should be care managers.

As the discussion above indicates, there has been a great deal of research on the effects of coordinated care for specific chronic conditions. One study included three programs that targeted a broad set of Medicare recipients, most of whom were over age 65. However, except for the studies in Washington and Indiana that were described earlier, there have been few rigorous evaluations of coordinated care programs for a diverse set of high-needs Medicaid recipients with multiple chronic conditions. This is an important gap in the research because more than 20 states have some form of coordinated care for Medicaid recipients.[30]

[29]Brown (2009).
[30]Rosenman et al. (2006); Arora et al. (2008).

Overview of the Colorado Access Coordinated Care Study

Individuals were eligible for the study if they were receiving Medicaid through one of three programs: (1) Aid to the Needy Disabled, which provides cash assistance to individuals who have a disability that is expected to last for at least six months and that precludes them from working; (2) Aid to the Blind, which provides cash assistance to low-income individuals who meet the Social Security Administration's definition of blindness;[31] and (3) Home and Community-Based Services for individuals with mental illness. Home and Community-Based Services waivers provide Medicaid benefits to certain groups who would not otherwise be eligible for Medicaid and who agree to receive services in their home or community rather than in a nursing facility or through long-term hospital care.[32] Individuals were excluded from the study if they were under 21 years of age or 65 or older, were eligible for both Medicare and Medicaid, were receiving Medicaid through Home and Community-Based Services waivers for individuals with brain injury or AIDS, or were in a nursing facility or long-term care facility. All individuals were receiving traditional fee-for-service Medicaid when they entered the study.[33]

Figure 1 illustrates the flow of people into the study. Each month, Maximus — the state's enrollment broker — sent MDRC a list of people who were eligible for the Colorado Access coordinated care pilot program in one of five Denver-area counties (Adams, Arapahoe, Boulder, Broomfield, and Weld). MDRC randomized the group so that 70 percent were placed into a program group and 30 percent were placed into the control group. The program group was larger than the control group to ensure that Colorado Access care managers had enough individuals to serve.

At the beginning of each month after randomization, Maximus sent letters to the program group telling them that they were being enrolled in Medicaid managed care and asking them to choose one of three managed care programs — Colorado Access, Denver Health, or the Primary Care Physician Program — or to choose to remain in fee-for-service Medicaid.

[31]The Social Security Administration defines statutory blindness as "central visual acuity of 20/200 or less in your better eye with use of a correcting lens" or "a visual field limitation in your better eye, such that the widest diameter of the visual field subtends an angle no greater than 20 degrees." See U.S. Social Security Administration (2013).

[32]See Colorado Department of Health Care Policy and Financing (n.d).

[33]"Fee-for-service" is the traditional approach to paying for health care in the United States, in which patients can visit the physician of their choice — both PCPs and specialists — and the physician determines the fees for specific services. In a typical managed care approach, by contrast, a health plan contracts with a network of providers who are paid a set fee for services, and members of the health plan must get their care from the network providers (to whom they make a copayment) or pay extra to use providers outside the network; managed care plans generally also require preauthorization for a visit to a specialist.

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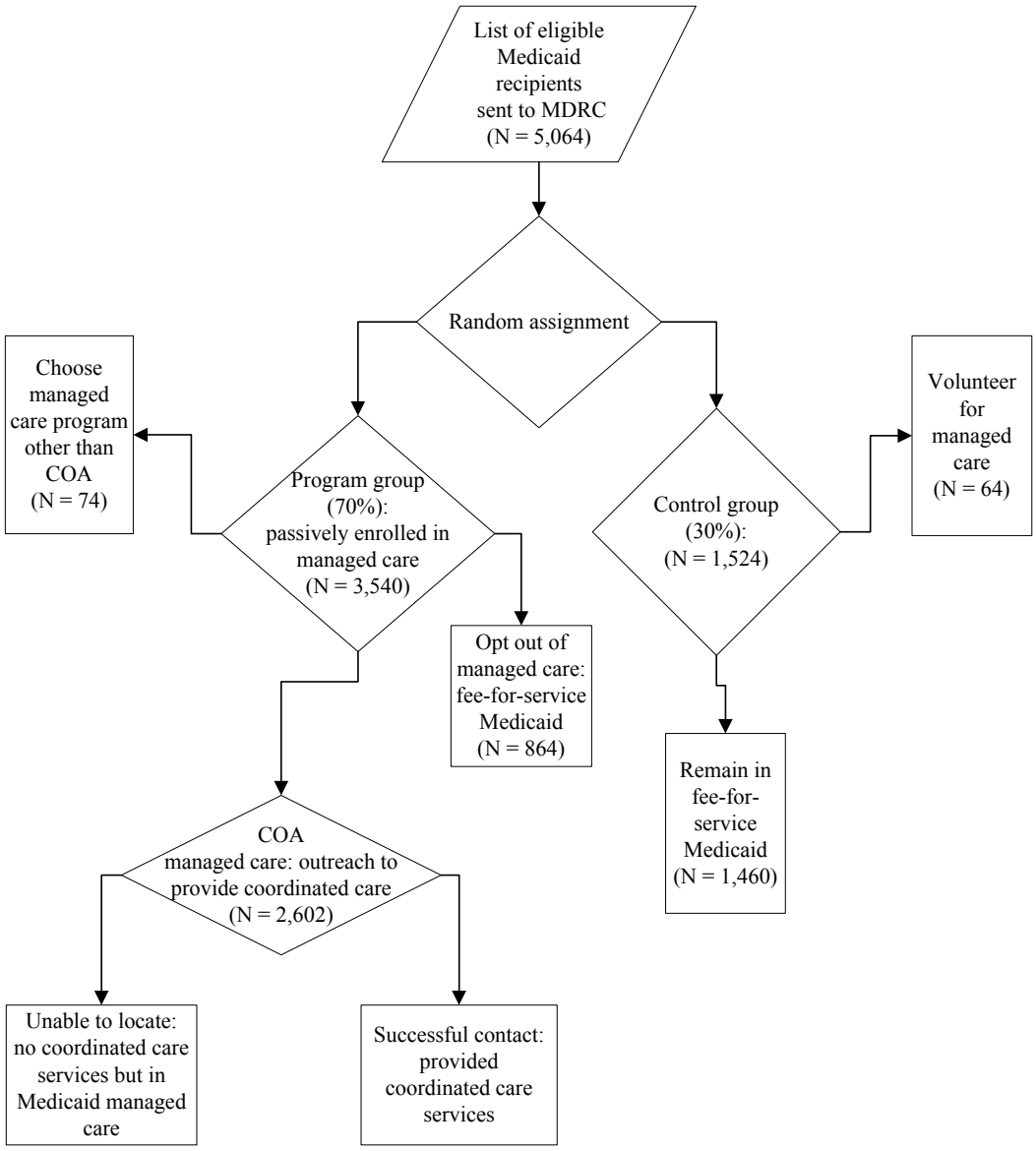
Figure 1

Flow of Individuals into the Colorado Access (COA) Coordinated Care Pilot Program



NOTE: Analyses were conducted from the time when passive enrollment letters were mailed through February 2010.

The mailing also contained a chart with information about the four options, a brochure about choosing a Medicaid health plan, a health plan "report card" that provided more information about each plan, and a list of doctors who were associated with each health plan. Individuals could indicate their choice by calling a toll-free number by the end of the month in which the mailing went out. Those who did not make a choice by the end of the month were enrolled in the Colorado Access managed care program (passive enrollment). All individuals could change their choice within 90 days of the mailing or one year after the mailing.

Here is an example of the process for program group members, who were eligible to receive coordinated care services through the Colorado Access managed care program. In April 2008, 1,054 Medicaid recipients in Adams County were randomized to the program group. After randomization, Maximus determined that 64 individuals were no longer eligible for the program, either because they were no longer receiving Medicaid under one of the three programs that made them eligible for the study, or because they had moved out of the county. On May 1, Maximus mailed enrollment letters to the remaining 990 members of this group. Anyone who did not respond by May 31 was placed (passively enrolled) in the Colorado Access managed care program. Each person had until the end of July (three months after the letter was mailed) to make a different decision or to opt out of the Colorado Access managed care program (for those who had been assigned to it by default).

The control group remained in fee-for-service Medicaid without coordinated care services. To receive permission from the Centers for Medicare and Medicaid Services (CMS) to allow individuals to be randomized, control group members were allowed to volunteer for managed care. This allowed the state to argue that it was not denying access to the program to anyone who was eligible for it.

Colorado Access attempted to find program group members who enrolled in its managed care program in order to provide them with coordinated care services. Individuals who enrolled in a different managed care plan or who opted to remain in fee-for-service Medicaid did not receive Colorado Access coordinated care services.

The program and control groups were maintained for two years after randomization. That is, program group members could receive coordinated care services for two years, and control group members could remain in fee-for-service Medicaid for two years (at which point the state had the option of placing them into a managed care program).

Between April 2008 and May 2009, MDRC randomly assigned 5,064 Medicaid recipients to the study, with 3,540 assigned to the program group and 1,524 assigned to the

control group.[34] Initially, enrollment was carried out by county, with letters mailed to eligible Medicaid recipients in Adams County in May 2008, to recipients in Arapahoe County in June 2008, and to recipients in Boulder and Broomfield counties in July 2008. Weld County was added later and individuals from that county were sent passive enrollment letters in December 2008. In other months, randomization was carried out with eligible individuals from any of the counties who were not already involved in the study.

Table 1 shows some characteristics of the counties that were included in the evaluation, and compares them with Colorado overall and with the United States. Of Colorado's population of roughly five million, more than 31 percent live in these five counties. These five counties were also better off economically than the rest of the nation. Median income was higher in each county than in the nation, and poverty and unemployment rates were generally lower.

There was substantial variability in demographics across the counties. For example, the percentage of residents who speak a language other than English at home ranged from 13.4 percent to 26.5 percent. Educational attainment likewise varied, with the percentage who had graduated from high school ranging from about 81 percent in Adams County to about 95 percent in Broomfield County, and the percentage graduating from college ranging from about 20 percent in Adams County to 56 percent in Boulder County.

In terms of health care, the percentage of individuals receiving Medicaid ranged from 8.8 percent in Broomfield County to 10.7 percent in Arapahoe County (percentages not shown in table). The Medicaid recipients in this study were thus part of a small minority in each county. Consistent with this finding, only about 1 percent of the adult residents in each county received Supplemental Security Income, a program that provides cash assistance for low-income individuals with disabilities and for which most individuals in the study were required to apply.

According to interviews with Colorado Access staff, medical services appear to be available in communities in which their members live. There are multiple community health centers in each county.[35] Many of these health centers are considered Colorado Access's "high-volume clinics," where a substantial number of members receive care, such as Metro Community Provider Network, Clinica, and Salud. There are also several safety-net hospitals throughout the region, such as Denver Health and University of Colorado Hospital. Furthermore, staff expressed no difficulty in getting members into

[34]MDRC randomly assigned another 906 individuals in October 2008, but passive enrollment letters were not mailed to this group. For this reason, this group was not included in the analysis presented in this report.

[35]There are no community health centers in Broomfield County.

Colorado Regional Integrated Care Collaborative: Colorado Access

Table 1

Characteristics of the CRICC Service Area

Characteristics	Adams County	Arapahoe County	Boulder County	Broomfield County	Weld County	Colorado	United States
Demographic and economic							
Population	420,708	543,331	289,005	53,311	242,378	4,884,568	301,237,703
Median annual household income ($)	54,777	59,402	65,960	72,170	55,569	56,574	52,175
Residents below the federal poverty level (%)	13.5	11.2	11.7	7.9	13.4	11.9	13.2
Language other than English spoken at home (%)	26.5	21.1	16.0	13.4	18.7	11.9	13.2
High school graduate, over age 25[a] (%)	80.7	89.8	93.2	94.5	83.4	88.6	84.5
Bachelor's degree or higher, over age 25 (%)	20.2	37.6	55.9	42.9	25.2	35.0	27.4
Unemployment rate (%)	5.7	5.1	3.3	5.9	4.8	5.3	6.4
Public transportation use[b] (%)	4.1	4.5	5.3	3.9	0.5	3.3	4.9
Type of health insurance							
Medicaid	40,511	57,868	30,153	4,709	24,940	576,691	NA
Uninsured[c]	77,735	40,360	30,820	30,820	26,707	687,670	NA
Supplemental Security Income (SSI) recipients							
Number of recipients	5,377	5,556	2,128	289	2,763	60,004	10,289,474
Number of blind or disabled recipients	4,458	4,330	1,827	213	2,398	51,148	8,765,288

SOURCES: U.S. Census Bureau, 2008 American Community Survey; 2008-2009 Colorado Household Survey; Social Security Administration, 2008; Centers for Medicare and Medicaid Services, 2008-2010.

NOTES: NA = not available.

[a]Includes high school equivalency.

[b]This measure is the percentage of all workers, age 16 and over, who use public transportation (excluding taxicab) to travel to work.

[c]Data drawn from the 2008-2009 Colorado Household Survey. Self-reported health situations for Boulder and Broomfield counties are reported as a combined calculation; data are not available for these counties separately.

mental health services. However, as in many other states nationwide, it was difficult to get access to specialist physicians who accept Medicaid. For example, access to dental services was one challenge, as Medicaid provides very little in the way of dental benefits (extractions only) and few dentists do pro bono work or have sliding fee scales. It was also difficult to find affordable eye care, another infrequent Medicaid benefit. Services that were not related to health care were also mentioned as being limited, including affordable housing and food resources.

Analytical Issues

Random assignment ensures that the program and control groups are similar in all respects when they entered the study except that one group — the program group — was passively enrolled in managed care and eligible for coordinated care services. Because the two groups are similar, the effects of passive enrollment are estimated by comparing later outcomes for the program and control groups. This approach is referred to as an *intent-to-treat* comparison because the intent was to provide the program to all individuals in the program group, even though it was understood that this was unlikely to happen.[36]

The comparability of the program and control groups at baseline means that comparing outcomes for the two groups after random assignment provides reliable estimates of the effects of passive enrollment. These estimates will understate the effects of the Colorado Access program, however, to the extent that program group members joined a different managed care program or opted to remain in fee-for-service Medicaid. Nonetheless, statistically significant differences between the program and control group outcomes would provide evidence that the Colorado Access program did change health care use.

To assess whether the program made a difference, statistical significance is used. Briefly, statistically significant impacts are ones that are large enough that they are unlikely to have resulted from a program with no true effect. To assess statistical significance, two-tailed tests were performed at the 10 percent significance level. That means two things. First, using a two-tailed test means that either a large positive or a large negative finding would be interpreted as evidence of the program's effect. This is appropriate since the coordinated care program might have increased health care use if it uncovered unmet needs, or reduced care from specialists and emergency department use through increased preventive care. Second, using a 10 percent significance level means that there is a 10 percent chance that a program with no true effect could generate a statistically significant impact estimate on any particular outcome. Thus, using statistical significance reduces the chance of incorrectly concluding that the program had an effect, but it does not eliminate it.

[36]Estimated effects were generated using linear regression adjustment to increase the statistical precision of the estimates. Covariates include number of Chronic Illness and Disability Payment System (CDPS) conditions, age, gender, the presence of certain categories of chronic conditions (cardiovascular, central nervous system, diabetes, gastrointestinal, psychiatric, pulmonary, and skeletal and connective tissue), county, and health care use through Medicaid in the past year (primary care visits, nonphysician visits, specialist visits, ED visits, hospital admissions, and number of prescription medications).

High-Needs Subgroup

When CRICC was being conceived, coordinated care was expected to have its largest effects for individuals who had made the greatest use of the health care system in the past year and had been diagnosed with the greatest number of chronic conditions. This is also consistent with the synthesis of coordinated care programs discussed earlier, which found the greatest success when coordinated care was targeted to patients at substantial risk of needing hospitalization in the coming year. Many in this group make frequent visits to the emergency department and are often hospitalized. By linking them to a primary care provider and helping them manage their conditions, coordinated care could help reduce their ED use and keep their conditions in check so they are less likely to be hospitalized. Because of this hypothesis, this report presents results both for the full sample involved in CRICC and for a subgroup of high-needs, frequent health care users.

To define this high-needs group, individuals were ranked based on the costs of Medicaid services used in the year before entering the study and their Chronic Illness and Disability Payment System (CDPS) score (also called the Kronick score), a method of predicting future health care costs of Medicaid recipients.[37] The two rankings were added together, and the top 20 percent highest-ranking cases were defined to be the high-needs subgroup.[38] Individuals with a number of serious health conditions that were not thought to be amenable to coordinated care were excluded from the high-needs subgroup, regardless of their previous health care use or CDPS score. These individuals included patients with hemophilia, sickle-cell anemia, pulmonary hypertension, and major organ transplants, as well as patients on life support and patients being actively treated for cancer.[39]

High-Participation Subgroup

As discussed in the Program Implementation section later in this report, about a quarter of the individuals who were assigned to the program group never enrolled in Colorado Access managed care and therefore could not have benefited from its coordinated care program. Because they could not have benefited from the program, including them in the analysis understates the effects of the program. The report therefore includes results for a "high-

[37]Kronick, Gilmer, Dreyfus, and Lee (2000).

[38]This ranking was developed jointly by Colorado Access, HCPF, the Center for Health Care Strategies, and MDRC based on 2007 claims data for study participants in the first four counties included in the evaluation.

[39]Specifically, individuals were excluded from the high-needs subgroup if they had ever had one of the following ICD-9 diagnosis codes at any time prior to random assignment: 286.XX (hemophilia); 282.41, 282.42, 282.49, 282.5, 282.6X, 282.7, 282.8, 282.9 (sickle cell); 416.XX (pulmonary hypertension); V42.XX or 996.XX (major organ transplant). Individuals were also excluded from the high-needs subgroup if they had a CPT procedure code of 94005, 99504, E0450, E0460-E0461, E0463-E0464, E048 (life support) or 96401-96549 or 77261-77499 (cancer) in the 12 months prior to random assignment.

participation" subgroup of individuals in which 82 percent of program group members were enrolled in Colorado Access managed care, compared with 64 percent of program group members in the "low-participation" subgroup.

This subgroup was defined by looking at which demographic characteristics and which characteristics of their prior Medicaid use predicted which program group members were ever in the Colorado Access managed care program. This analysis resulted in a predicted probability of being in Colorado Access managed care for each individual in the sample. The sample was then divided in half, so program group and control group members who had the highest predicted probabilities were placed into the high-participation subgroup.

Data Sources

Data that are used in this analysis come from two sources. The primary source is Medicaid claims provided to MDRC by HCPF. These claims provided information on Medicaid use for the entire sample prior to random assignment, for control group members and all program group members who opted out of managed care for the period following random assignment, and for Colorado Access enrollees beginning on March 1, 2010. Colorado Access provided encounter data on health care use for Colorado Access enrollees from the time of random assignment through February 28, 2010.[40]

Although these two sources of data provide information on most Medicaid care during the study period, they are missing several key pieces of information. First, data may have been incomplete while individuals were in other managed care organizations, such as Denver Health. Second, behavioral health services are provided to the Medicaid population as a carve-out based on county of residence; Medicaid recipients are assigned to a behavioral health organization based on where they live. Data may have been incomplete for care provided by these organizations. Thus, the analysis may understate the amount of Medicaid-funded health care used by individuals in the study.

Outcomes

The evaluation includes a range of outcomes that could be examined using Medicaid claims data and reflects the logic of the coordinated care model — namely, that the program will encourage people to make greater use of preventive care and thereby reduce hospitalizations and emergency department visits.

[40]For those managed care organizations that receive a fee for each patient, regardless of the care provided, each service rendered is considered an "encounter."

- **Emergency department visits.** A successful coordinated care program should reduce ED visits by linking patients to a primary care provider and helping them make and keep appointments with that provider. The evaluation consequently examined impacts on the proportion of individuals who made an ED visit and the number of visits per person.

- **Hospital admissions.** The expected effect of coordinated care on hospital admissions is less clear. In the short term, the program might increase hospital admissions if care managers uncover unmet needs that warrant inpatient care. Over the longer term, however, coordinated care should increase use of preventive care and compliance with treatment, thus reducing the severity of illness and reducing the number and length of hospital stays. By working intensively with patients after they are released from hospital care, coordinated care might also keep them from being rehospitalized. For these reasons, the evaluation examined the effects of passive enrollment on the proportion of individuals ever admitted to the hospital, the number of hospital admissions, the average number of inpatient days, and the proportion of individuals who were readmitted within 30 days.

- **Outpatient care.** The program was expected to increase visits to primary care providers. It might also have increased visits to specialists if care managers or the primary care provider uncovered unmet medical needs. Care coordination might also have reduced visits to specialists over the longer term if primary care providers were taking care of those medical needs. The evaluation therefore estimated the effect of the program on the use of various types of outpatient care.

- **Prescription medications.** Coordinated care might also affect the use of prescription medications. Care managers were expected to encourage individuals to take recommended medications and refill prescriptions. At the same time, care managers might have uncovered combinations of medications that are contraindicated and worked with health care providers to change the prescribed drug regimen. Because the appropriate drug regimen for individuals with multiple chronic conditions is sometimes unclear, this document reports only the average number of prescriptions filled by the program group compared with the control group. Thus, changes in the specific medications that individuals are taking will not be detected in the analysis if they do not change the number of prescriptions that are filled.

Characteristics of the Sample

Table 2 describes the study sample, including two measures of demographics (age and gender) and health care use under Medicaid for the year before passive enrollment. Because randomization resulted in similar program and control groups, the table does not show the two groups separately. Given that program group members were allowed to opt out of the Colorado Access program, the last two columns of the table show characteristics for those who did and did not enroll in Colorado Access managed care at some time following passive enrollment.

The average age for sample members is about 44 years, and about 41 percent of the sample is male. In addition, the CDPS score was 1.6 for the full sample and 1.4 for Colorado Access enrollees. These numbers mean that the full sample was expected to use about 60 percent more health care than the average for Medicaid recipients with disabilities, while Colorado Access enrollees were predicted to use about 40 percent more health care than average. Thus, Colorado Access enrollees were not predicted to use as much health care as the typical study member.

Consistent with the last point, Colorado Access enrollees used somewhat less health care than the full sample in the year before random assignment. For example, enrollees spent 2.2 days in the hospital on average in the year before entering the study, compared with 3.0 days for the full sample. Even more striking is the difference in costs of prior health care use: in the year before random assignment, those who enrolled in the Colorado Access program used $10,785 in Medicaid-funded health care compared with $15,050 for the full sample.

Comparing the full sample with Colorado Access enrollees shows small but consistent differences in the percentages who were diagnosed with various conditions. For example, 35.2 percent of Colorado Access enrollees had been diagnosed with a cardiovascular condition compared with 36.8 percent of the full sample. Other common conditions that were diagnosed before entering the study included diseases of the central nervous system (18.8 percent of the enrollees), gastrointestinal disorders (20.0 percent), psychiatric disorders (28.4 percent), and skeletal and connective tissue disorders (22.1 percent), all of which were higher in the full sample than among the Colorado Access enrollees. These differences are all statistically significant, meaning they are unlikely to be a result of chance.

As discussed earlier, it was anticipated that the effects of the CRICC program would be larger for a high-needs subgroup that was expected to make the greatest use of the health care system. Table 3 compares characteristics of the high-needs subgroup with the remainder of the sample. As expected, the high-needs subgroup is much sicker on average and made much greater use of the health care system in the previous year. They spent more than three times as much on health care through Medicaid in the prior year than the remainder of the sample

Colorado Regional Integrated Care Collaborative: Colorado Access

Table 2

Selected Demographics, Medicaid Use, and Chronic Health Conditions, Year Before Study Entry, by Full Sample and Enrollment Status of Program Group

Characteristic	Full Sample	Program Group: Enrolled in Colorado Access Managed Care	Program Group: Not enrolled in Colorado Access Managed Care	
Demographics				
Average age (years)	44.2	44.3	44.4	
Male (%)	41.2	40.4	45.0	**
Medicaid use in prior year				
Average number of emergency department visits	1.3	1.3	1.2	
Average number of hospital admissions	0.3	0.3	0.4	**
Average number of inpatient days	3.0	2.2	4.6	***
Average CDPS score[a]	1.6	1.4	1.8	***
Total Medicaid costs in prior year ($)	15,050	10,785	25,353	***
Chronic conditions (%)				
Cancer	4.9	4.0	6.0	**
Cardiovascular	36.8	35.2	41.0	***
Central nervous system	21.7	18.8	29.1	***
Cerebrovascular	3.4	3.0	4.7	**
Developmental disability	2.8	1.2	6.2	***
Diabetes, Type 1	5.1	4.7	4.7	
Diabetes, Type 2	12.1	11.9	13.3	
Eye	6.6	6.0	7.9	*
Gastrointestinal	21.9	20.0	26.4	***
Hematological	5.0	4.2	6.5	**
Infectious	9.0	7.9	10.3	**
Metabolic	11.7	9.8	17.1	***
Psychiatric	30.0	28.4	33.5	***
Pulmonary	25.0	23.3	27.8	***
Renal	11.9	9.9	15.1	***
Skeletal and connective tissue	23.6	22.1	27.2	***
Skin	10.1	9.5	11.3	
Substance abuse	10.8	10.1	12.4	*
Sample size	5,064	2,602	938	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing.

NOTES: Statistical significance levels of differences between Colorado Access enrollees and program group nonenrollees are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

[a]The higher the CDPS score, the higher the expected use of the health care system.

Colorado Regional Integrated Care Collaborative: Colorado Access

Table 3

Selected Demographics, Medicaid Use, and Chronic Health Conditions, Year Before Study Entry, by High-Needs Subgroup and Remainder of the Sample

Characteristic	High-Needs Subgroup	Remainder of Sample	
Demographics			
Average age (years)	47.5	43.4	***
Male (%)	38.4	41.9	**
Medicaid use in prior year			
Average number of emergency department visits	2.4	1.0	***
Average number of hospital admissions	0.7	0.2	***
Average number of inpatient days	6.3	2.2	***
Average CDPS score[a]	2.8	1.3	***
Total Medicaid costs in prior year ($)	34,956	10,072	***
Chronic conditions (%)			
Cancer	8.9	3.9	***
Cardiovascular	62.0	30.5	***
Central nervous system	49.4	14.8	***
Cerebrovascular	8.8	2.0	***
Developmental disability	5.8	2.0	***
Diabetes, Type 1	11.1	3.6	***
Diabetes, Type 2	22.2	9.6	***
Eye	13.4	4.9	***
Gastrointestinal	45.7	15.9	***
Hematological	7.3	4.4	***
Infectious	19.1	6.5	***
Metabolic	27.6	7.7	***
Psychiatric	50.9	24.7	***
Pulmonary	52.8	18.1	***
Renal	27.1	8.1	***
Skeletal and connective tissue	42.1	18.9	***
Skin	20.5	7.5	***
Substance abuse	19.3	8.7	***
Sample size	1,013	4,051	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing.

NOTES: Statistical significance levels of differences between Colorado Access enrollees and program group nonenrollees are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

[a]The higher the CDPS score, the higher the expected use of the health care system.

($34,956 versus $10,072), made more than twice as many emergency department visits, had three times as many hospital stays, and spent nearly three times as many days in hospitals (6.3 days versus 2.2). The high-needs subgroup also had a CDPS score that was more than twice as high as the remainder of the sample, and they faced many more chronic conditions: 62 percent had cardiovascular disease compared with 30.5 percent of the rest of the sample, and about 50 percent suffered from disorders of the central nervous system, gastrointestinal disorders, pulmonary disease, and psychiatric disorders, which were in much less evidence among the remainder of the sample. In fact, the high-needs subgroup suffered from about five chronic conditions on average, compared with about two for the remainder of the sample (not shown in Table 3).

Enrollment in Managed Care and Coordinated Care

As noted above, individuals who were assigned to the program group could opt out of managed care or could choose a managed care provider other than Colorado Access. Likewise, control group members could volunteer for the Colorado Access program. Finally, those who enrolled in the Colorado Access program could ask to be disenrolled for many reasons, including a desire to return to fee-for-service, to transfer to another managed care program, or if they didn't want to change providers to one in the Colorado Access network.

A natural question in light of the design is how consistently individuals were enrolled in the Colorado Access managed care program, whether program group members opted for managed care other than Colorado Access, and whether control group members volunteered for managed care. Figure 2 investigates this issue by showing the percentage of program group members who enrolled in Medicaid for the three months prior to passive enrollment and the 21 months following passive enrollment. In addition, the figure shows the proportion who were in Colorado Access, the proportion who remained in fee-for-service, and the proportion who enrolled in Denver Health, which was the primary managed care alternative to Colorado Access. The ideal would be for everyone to have remained on Medicaid throughout the follow-up period and for all program group members to have been enrolled in Colorado Access's managed care program throughout. The figure is limited to 21 months because the evaluation team did not have data after March 2010 on who was enrolled in the Colorado Access program.

The figure shows the following:

- Most people stayed enrolled in Medicaid through the 21 months following passive enrollment in Colorado Access managed care. By 21 months following the passive enrollment date, more than 80 percent of the program group remained enrolled in Medicaid.

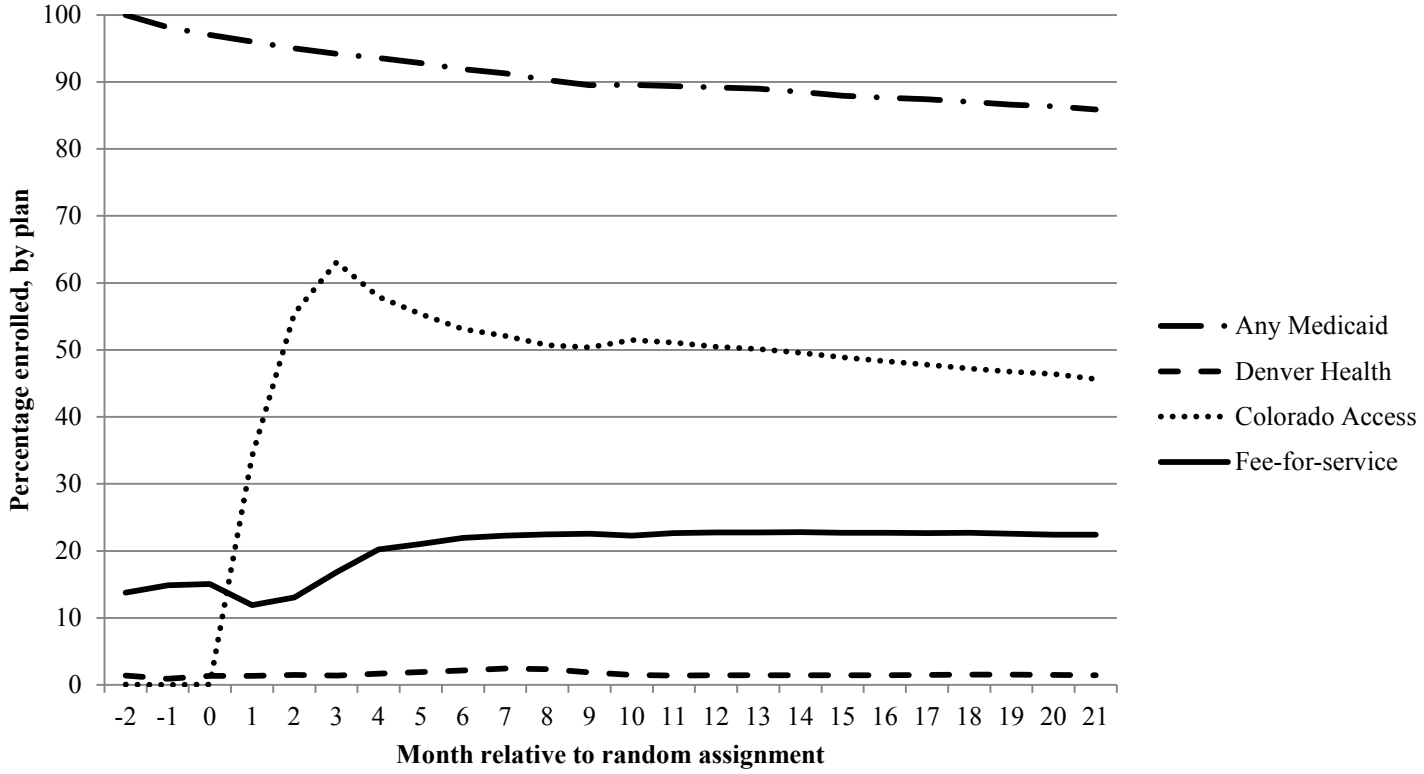
- The percentage of the program group who were enrolled in the Colorado Access managed care program never went much above 50 percent and declined from just over 60 percent in month 3 to about 50 percent in month 9. This is not too surprising; when Denver Health went through a similar process in Denver, about half of individuals opted out. The study included more than 5,000 people to provide enough statistical power to detect modest impacts even if a substantial proportion of the program group opted to remain in fee-for-service Medicaid.

- The percentage of the program group who remained in fee-for-service was consistent at about 17 to 23 percent during the 21 months following passive enrollment in Colorado Access managed care.

Colorado Regional Integrated Care Collaborative: Colorado Access

Figure 2

Percentage of Program Group Members Enrolled in Medicaid, Fee-for-Service Medicaid, Colorado Access Managed Care, and Denver Health Managed Care, by Month Relative to Random Assignment



- Enrollment in the Denver Health managed care program — the main managed care program other than Colorado Access that study members used — was fairly low, at around 2 percent following the start of the program.

One final concern was that control group members might volunteer for the Colorado Access program, reducing the treatment contrast between the program and control groups. This turned out not to be the case. Only 14 of the 1,524 control group members joined the Colorado Access program.

Although enrollment in Denver Health was low overall, it could nevertheless pose a problem for the evaluation if control group members were enrolling in Denver Health at a lower rate than program group members. Because information on health care use may have been incomplete while individuals were enrolled in the Denver Health program, a difference in the enrollment rate between the two groups would mean that more data would be missing for program group members than for control group members. The estimated impacts would thus understate the true effects on health care use. Figure 3 compares the proportion of program group and control group members who enrolled in Denver Health.

Before random assignment was conducted, the two groups were equally likely to be enrolled in Denver Health, with about 1.4 percent enrolled in Denver Health at the time of random assignment. Following random assignment, a gap emerged between the two groups. By month 9, 1.9 percent of the program group was enrolled in Denver Health compared with 0.9 percent of the control group. While these percentages are low, health care use will be slightly understated for the program group compared with the control group. The estimates of the program's effect will consequently be slightly too high.

Outreach and Enrollment

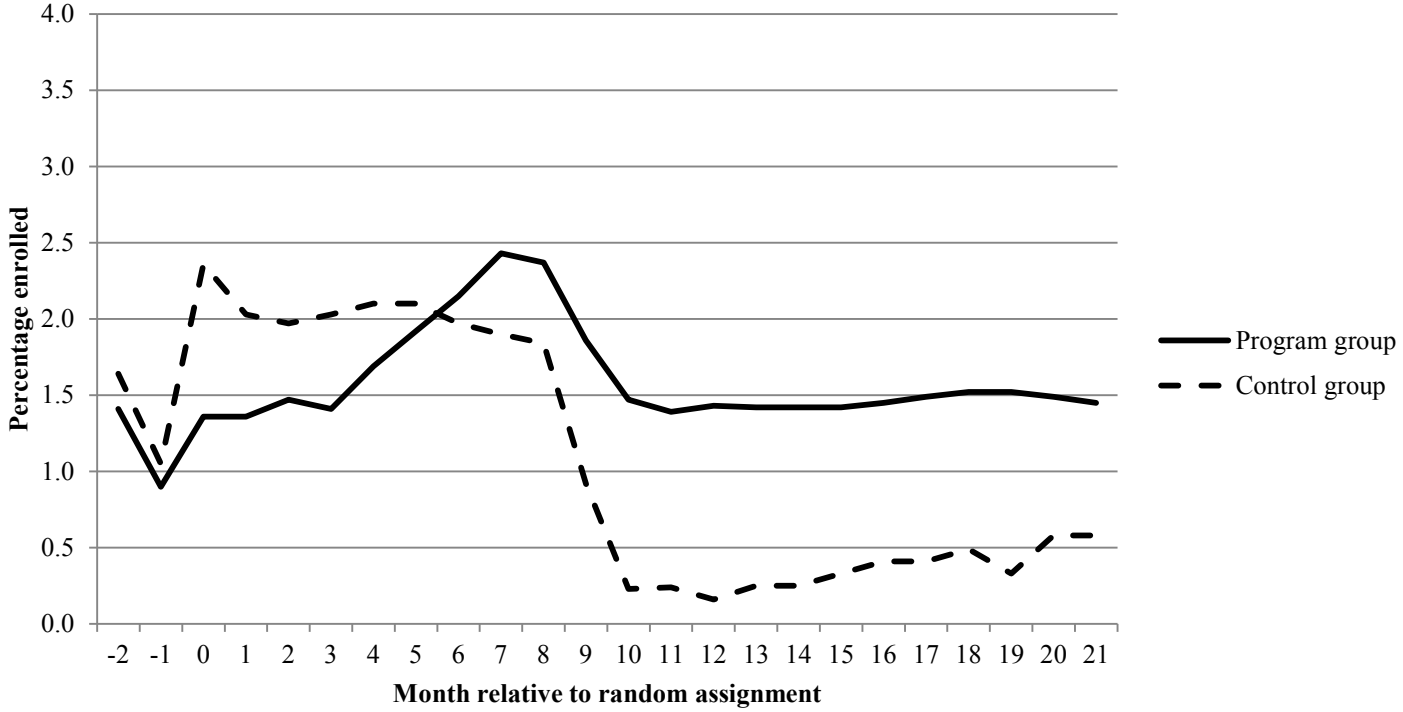
Enrolling individuals in the Colorado Access managed care program was only the first step toward providing coordinated care services. The next step was to engage individuals in those services.

Newly assigned members rarely called Colorado Access after receiving the passive enrollment letter. Instead, care managers were responsible for outreach to passively enrolled CRICC members to get them actively involved in the health plan. To facilitate outreach, Maximus provided enrollment lists that included member contact information to Colorado Access after the passive enrollment letters were mailed. Initial enrollment lists included a significant number of members in long-term care facilities who should not have been assigned to CRICC. Furthermore, the lists had incorrect, missing, or outdated contact information.

Colorado Regional Integrated Care Collaborative: Colorado Access

Figure 3

Percentage of Program and Control Group Members Enrolled in Denver Health, by Month Relative to Random Assignment



Therefore, care managers had to use alternative methods to find individuals, such as searching pharmacy or provider claims, conducting LexisNexis® searches,[41] and attempting to obtain updated contact information from high-volume clinics and community health centers.

All outreach was done by telephone to mitigate concerns about staff safety, and outreach assignments were based on the member's area of residence, which may have helped to identify providers by area. Care managers used a loosely designed protocol for framing their contacts with members. Even when care managers had accurate contact information, it was often difficult to reach individuals by phone or to get a member to return the call. For example, Colorado Access reported that it often took 10 to 20 calls to reach a member to perform a health assessment. The Director of Coordinated Care noted that the population was much more transient than expected based on experience with government programs.

Despite care managers' persistence in trying to reach passively enrolled members, they actively engaged only about half of those who were passively enrolled in coordinated care services. Once a care manager established contact and began building a relationship, members were likely to stay engaged.

[41]LexisNexis® is an electronic database that enables computer-assisted searches of legal and public records–related information.

Program Implementation

This section describes the design and implementation of the Colorado Access CRICC coordinated care program.

Organizational Structure

Overview of Colorado Access

Colorado Access is a nonprofit health plan that was established in 1994 through a partnership of four Denver-area health systems as a health management organization (HMO). When founded, Colorado Access focused on mothers and their children. Since then the organization has shifted to include adults with disabilities. During the time it operated a CRICC coordinated care program, Colorado Access had three lines of business besides CRICC: a behavioral health carve-out for Denver County, Child Health Plan Plus (the State Child Health Insurance Program) for low-income children, and Colorado Access Advantage for Medicare recipients. Colorado Access also provided administrative services such as processing claim payments and evaluating the appropriateness of medical care for two other managed care networks.

Colorado Access's intensive care management model — on which the CRICC program was based — was initially developed through a demonstration, supported by the John D. and Catherine T. MacArthur Foundation and the Robert Wood Johnson Foundation, to focus on the treatment of depression in primary care. The demonstration program was targeted at Medicaid recipients with depression who had high CDPS scores and high past medical costs. The demonstration included care management, supervision of care managers by psychiatrists, and telephone consultations with primary care providers. Results from the demonstration suggest that the program increased visits to primary care providers, decreased emergency department visits and hospital admissions, reduced depression scores, and realized cost savings.[42]

Colorado Access's partnership with HCPF for CRICC was a natural extension of the previous care management work and allowed the health plan to apply lessons from its earlier work to the Medicaid population. Until its involvement with CRICC, Colorado Access was working with Medicaid recipients through its Denver County behavioral health carve-out only, but it did work with Medicare recipients.

CRICC Contract Structure

Colorado Access began operating its CRICC program in June 2008 as a capitated health management organization (HMO) model — that is, there is a set fee per patient regardless of the

[42]Barry and Thomas (2005).

treatment required. Through February 2010, Colorado Access received a set amount each month from the State of Colorado to provide medical care and coordinated care services for each Medicaid recipient who was enrolled in its CRICC program. Colorado Access also contracted with providers at high-volume clinics to offer clinic-based coordinated care; providers received $8 per member per month for offering these coordinated care services, in addition to the equivalent of the state fee-for-service payments from Colorado Access for health care services. Providers also had the opportunity to share any savings if enrollees used less health care than was covered by the monthly payments. Because health care services were paid by Colorado Access, the health plan had knowledge of hospital admissions and all costs except for behavioral health care outside Denver County. With this financing structure, enrollees were not required to make copayments to receive care.[43]

Beginning March 1, 2010, Colorado Access's contract with the state changed to a primary care case management model. With this change, CRICC members received their health care through the fee-for-service system rather than through Colorado Access, and Colorado Access received a $32 fee per member per month to provide coordinated care services. The State of Colorado became the payer of all medical claims. With the change, providers no longer qualified to share in any cost savings, and copayments were introduced. Copayments for doctor appointments were set at $2 each and prescription copayments were set at $1 for generic drugs and $2 for other medications. Because all enrollees had low incomes, these copayments could represent a financial burden, especially for those with multiple prescriptions that needed to be filled each month. The change in financing structure did not seem to affect which providers Colorado Access members sought for treatment, but it reduced care managers' ability to obtain "real-time" (current) information about members' health care use, such as hospital admissions and ED visits. This is described in more detail in the next section.[44]

Information Technology, Quality Assurance, Data

Colorado Access used a variety of data systems to store, manipulate, and analyze various forms of data. A transaction system maintained claims, eligibility, enrollment, and prior authorization information. A separate coordinated care system housed information that was entered by care managers and included health assessments and notes about members. These two systems were not connected, so the transaction system did not generate alerts about hospitalizations or other events that were created. A warehouse management software package brought

[43]Colorado Access received additional funding from the Colorado Health Foundation to provide coordinated care services to the CRICC population that the organization might not otherwise have been able to offer, such as support for using social services.

[44]A comparison of results in health care use over time found similar levels of use before and after the contract change.

together different data for analysis, and a separate tool was used for identifying patterns in the data (known as "data mining"); risk prediction modeling was conducted with this tool, which was fed by claims data and also generated notifications for care managers if a member was due for an appointment.

Until March 2010, Colorado Access was the payer of record for all medical expenses (except behavioral health care) of CRICC members; therefore, the health plan had access to real-time claims and authorizations, which was especially helpful for knowing who was in which hospital. The health plan also used data mining to better understand members' care patterns and needs; the care managers used this information to plan their coordinated care approach with each member. With the contract change in March 2010, however, real-time claims information was no longer available to Colorado Access. Instead, the health plan became reliant on the state claims data, which lagged service receipt by several months and was not always consistent. Although the health plan developed work-arounds to maintain some level of information about its members' care — especially hospitalizations — care managers did not see as much operational utility in the new data. Colorado Access staff described the loss of real-time data as a detriment to providing effective coordinated care.

Program Intervention

This section describes the Colorado Access CRICC program based on information that was gathered from interviews with health plan leadership and care managers that were conducted in May 2010 and March 2011. Information was not available to the evaluation team from the Colorado Access coordinated care system, making it difficult to describe members' participation and program "dosage" (or amount and intensity of services).

CRICC members received coordinated care services from a subset of Colorado Access's coordinated care personnel; care managers did not work exclusively with CRICC members and not all care managers worked with CRICC members. Care managers came from clinical and nonclinical backgrounds and were supervised by registered nurses. Coordinated care was primarily conducted by telephone, although on occasion a care manager did visit the member at a doctor's office, and for part of the intervention period some care managers were located in clinics used by a large number of Colorado Access members. Because they were concerned about staff personal safety, care managers very rarely conducted home visits and then only to get a better sense of a member's circumstances; Colorado Access did not view home visits as a necessary tool for getting to know all members. Those who lived closer or used a high-volume clinic were more likely to have some in-person contact than members living farther away from Colorado Access.

The scope of Colorado Access coordinated care activities for each participating member was initially determined through a health assessment; findings and necessary actions were

recorded in a care plan for each member. Members were stratified based on their CDPS scores and results of the health assessment in order to classify their needs, and expectations for frequency of contact were determined by a stratification system (discussed in more detail below). However, care managers described the follow-up requirements as "fluid," which suggested that the stratification was only a very loose framework. Contact with members was most frequent within the first 90 days of their involvement with Colorado Access. After that, contact typically tapered down to quarterly or less often depending on the member's needs.

Maintaining members' engagement and retention in Colorado Access was one of the biggest challenges for care managers. The care managers describe the CRICC member population as very transient and difficult to contact; most members had a prepaid cell phone that expired between contacts. Care managers noted that persistence was vital to establishing relationships and keeping them intact. Persistence, even when a member did not appear to be interested in what the care manager had to offer, was one way the care managers demonstrated their interest in helping the members.

Trying to effect lifestyle changes — which made up a great deal of the case manager's role — was challenging and not immediately realized. Staff noted that cultivating self-empowerment and self-sufficiency, and inspiring members to change, was difficult. Commonly noted successes included members' arranging their own appointments or transportation to appointments. If a member demonstrated the ability to achieve his or her goals and take charge of his or her own health care, then "graduation" to less frequent contact was possible. This decision was made by the care manager, the member, and the nurse supervisor.

Staffing Structure, Care Manager Qualifications, Training, Caseloads

Colorado Access coordinated care was not limited to individuals who qualified through CRICC, but was also available to other Colorado Access plan members such as Medicare recipients. All members who qualified for coordinated care received the same service. Colorado Access had 13 full-time care managers, of whom 7 were responsible for CRICC members. These care managers also carried a non-CRICC caseload. While the Director of Medicaid Programs provided general oversight of CRICC, the Director of Coordinated Care supervised the coordinated care team. Two Nurse/Care Manager Supervisors, who were registered nurses (RNs), directly supervised the care managers.

Care managers had a variety of backgrounds and experience, including mental health counseling, quality improvement in a health field, psychology, clinical research, and geriatric nursing. Although care managers had experience in health-related fields, they did not necessarily have coordinated care experience. For example, at least one care manager had a background in clinical research and another in quality improvement for the health care industry. Most care managers were women and several were bilingual in Spanish and English. At the time of the

last site visit (March 2011), each care manager had between 300 and 800 total cases, of which about 100 were likely CRICC members. According to the Colorado Access care management philosophy, the caseloads were mixed to include members with a range of needs and frequency of contact requirements. Furthermore, care managers noted that only about 100 members were likely to be actively engaged at one time. Care managers noted that the caseload was generally manageable because not all members were active at the same time.

The CRICC coordinated care team had one formal meeting per week. This was a roundtable discussion for care managers to bring questions to a multidisciplinary group for advice on care; this group included nurse practitioners, psychiatrists, and medical technicians. There was no individual supervision between supervisors and care managers. Other meetings and all supervision were handled more informally as needs arose.

Care manager turnover existed but was not more than the supervisors expected. All new employees were oriented to Colorado Access but did not receive detailed instruction about the state's Medicaid benefits. Staff learned primarily through on-the-job training, though they were formally trained in motivational interviewing, a directive, client-centered counseling style intended to elicit behavioral change by helping clients explore and resolve ambivalence.[45]

Staffing Model Change

Staff deployment evolved over time. Colorado Access identified several community health centers that were used by a large volume of their members. While most care managers were based in the Colorado Access main office, some of them operated from these high-volume health centers. This staffing model presented several problems. First, as part of the agreement to work on their premises, health centers expected Colorado Access care managers to see only members using those facilities for care. The health centers did not want the Colorado Access staff located there to work with patients of other facilities. However, the caseload for care managers based in health centers (as opposed to the caseload assigned to the Colorado Access office staff) was not as high as expected, so the case managers' caseload could not be maximized. Furthermore, there was some confusion about whether health center staff or Colorado Access was responsible for setting the care managers' work priorities, which created some tension for the care managers. Starting in the spring of 2012, all care managers were reassigned from health centers to the Colorado Access main office, though at least one care manager maintained at least weekly contact with each health center. This staffing change allowed Colorado Access to maximize caseloads and coincided with the contract shift from a capitated HMO model to a primary care case management model.

[45]Miller and Rollnick (1991).

The new staff deployment model was based on the idea that the CRICC population fit into three "buckets":

1. Members who were receiving care from their primary care provider
2. Members who were receiving care from someone other than their primary care provider, such as a specialist
3. Members who were not receiving any care

Colorado Access care managers focused on the members in the last two buckets, with the ultimate goal of getting more members into the first bucket and receiving care from their primary care provider. Colorado Access envisioned this arrangement as the ideal coordinated care scenario.

According to a Colorado Access analysis of claims data in May 2010, 30 percent of the members were classified in the first bucket, 23 percent were in the second bucket, and 47 percent were in the third bucket. Colorado Access discovered that the members in each of these groups required different levels of intervention and support. Colorado Access began to give primary care providers a fee of $12 per member per month for members assigned to and in their care (that is, members in the first bucket). This fee was designed to reimburse the primary care provider for working with the coordinated care team.

Assessment and Care Planning

Once a new member was located and agreed to participate in the coordinated care program, the care manager conducted a health assessment to ascertain current conditions, current needs, and future risks. The assessment was conducted primarily by telephone during the first contact, although some were completed in person or by mail.

The health assessment used a combination of established tools, such as the Patient Health Questionnaire (PHQ-9) for depression and the SF-12, a survey instrument that measures eight dimensions of physical and mental health.[46] The assessment also included questions about medical history, living situation, medications, and social service connections. The assessment took approximately 15 to 60 minutes to complete, depending on the individual's history, and was planned to be administered at least every six months. According to care managers, however,

[46]For the PHQ-9, see Kroenke, Spitzer, and Williams (2001). For the SF-12, see Ware, Kosinski, and Keller (1996).

there was flexibility in determining the suitable time for reassessment. For example, one care manager explained to the research team that the full assessment was administered annually, but the PHQ-9 was administered more frequently if the initial results were troubling.

In addition to the assessment, Colorado Access used CDPS scores based on prior medical expenditure data to project future risk and thereby determine stratification levels. The stratification system set guidelines regarding frequency of contact for all members who were engaged in coordinated care. Although the stratification system set contact parameters, staff noted that frequency of contact was always tailored to a member's needs regardless of risk score. The level of contact also depended on the member's interest in being connected with the care manager.

While this stratification system was used from the beginning of CRICC's operations to classify member needs, the health plan staff began thinking about their population in terms of the three buckets mentioned on page 32 as a way to better understand how the members were being served. Toward the end of CRICC's operations, Colorado Access began staffing changes to align with those buckets, but the timing of those changes likely had little effect on this evaluation.

Care Plan

Following the assessment process, care managers developed care plans for members based on the assessment findings and other input from the member, and each care plan was reviewed by supervisors. Members were not necessarily aware that the care managers were developing such plans, although each member may have received a copy. The care plan was often shared with primary care providers, particularly within high-volume clinics. One trend that the care managers commonly noted was that, not surprisingly, members were not always straightforward about their health and current or past treatments, and therefore the care plans would not reflect every need. For example, the care managers did not always have an accurate understanding of the medications that a member took or a complete alcohol or substance abuse history. This information gap was partially overcome, initially, by examining Colorado Access claims information. However, after March 2010, care managers had to rely exclusively on members' self-reports and historical data, and they believed this limitation hampered their effectiveness.

Sally's story, in Box 1, provides an example of how care managers used assessments to determine what should take priority in the care plan. For Sally, the assessment indicated that the patient's mental health problems should be given the highest priority.

Box 1

Sally's Story: Focusing on Mental Health

Sally, a 23-year-old female who lived with her mother, had a variety of mental health and medical conditions: schizophrenia, bulimia, obesity, asthma, weak bladder, heart murmurs, back pain, carpal tunnel syndrome, and other ailments. The results of Sally's health assessment determined that her care plan would initially focus on treating her mental health problems. The care manager helped Sally to connect with the Denver mental health agency and accompanied her to the agency intake appointment. This was the only time the care manager met Sally in person. After missing her first therapist appointment, Sally began attending biweekly sessions.

Sally was already connected with a primary care provider and was managing her own care. She saw her PCP monthly, so the care manager did not have contact with the doctor. The care manager did provide information about transportation, housing assistance, and eye care. Though Sally followed through on referrals for these services, it took her a long time. Sally was also difficult to reach; sometimes six to eight weeks went by without contact.

Care plans consisted of several elements: member's health condition, interventions planned, medical and social goals, and care manager follow-up required. Once one goal was met, another was added; in this way the care plan was a living document. Common initial care plan goals included securing food resources or affordable transportation, reducing the number of ED visits and hospital admissions, providing education on going to a primary care provider rather than the ED, providing education on medical conditions, attending scheduled appointments with providers, and adhering to treatment plans. When developing a care plan, the care manager's priority was to address the member's social service concerns — such as getting housing or food — before addressing other priorities that the care manager may have identified, which could be more medical in nature. For example, care managers noted that they were not going to address PCP care until a member had stable housing and a secure food source. Care managers used motivational interviewing techniques to encourage members to address goals that they may not have viewed as priorities. This was particularly useful in helping members understand that medical difficulties often have a direct (deleterious) effect on social life. For example, care managers explained that a member with uncontrolled diabetes had a restricted social life because of her health condition; this bothered her. By learning to control her diabetes she gained mobility and the ability to participate in social activities again. Helping the member to understand the connection between diabetes and a limited social life would not have been possible without motivational interviewing.

Patient Education

During telephone calls with members, care managers provided educational information as appropriate — for example, education on the appropriate use of the emergency room or information about a particular disease or condition. Care managers also mailed educational materials to members, using literature from well-established medical and health care education vendors such as McKesson and Healthways. All reading materials were provided at the sixth-grade reading level. These mailings were conducted as needed based on a member's behavior. Chad's story, told in Box 2, is one example of how a care manager had to educate a member on the appropriate use of the emergency room.

Box 2

Chad's Story: Reducing Emergency Room Visits

Chad was a 51-year-old male with a variety of medical conditions: diabetes, congestive heart failure, coronary artery disease, gout, hypertension, asthma, cardiac episodes, and kidney problems. He lived in a duplex with his wife, who was also in poor health. Chad had relationships with his sister and mother, who lived nearby, but he did not want to rely on them too much.

When the Colorado Access care manager first contacted him, Chad already had a primary care provider, but not at one of Colorado Access's high-volume clinics. Based on his health assessment, the primary goal in Chad's care plan was to educate him about going to his primary care provider rather than to the emergency department. Although he had a primary care provider, Chad had made multiple emergency department visits; he believed this was acceptable because there was no copay for emergency department visits but there was a copay for visits to his primary care provider. The care manager worked to change this belief and pattern of behavior.

The care manager did not have any communication with Chad's primary care provider except to inform him of her relationship with Chad. In addition, the care manager had only telephone contact with Chad; it was difficult to reach him monthly as he did not always answer the phone or return calls.

Coordinated Care and Physician Engagement

Care managers served many functions, including helping members to navigate the complicated medical system. When multiple providers were involved in the care of one member, the care manager bridged gaps between those providers. Care managers made medical appointments for members and met them at appointments, established members with a new

PCP if necessary, resolved problems with prescription adherence issues, arranged transportation to medical appointments, reminded members of appointments, followed up with members after appointments, and assisted with identifying social service resources. One member described to the research team how her care manager took the time to explain things to her, whereas, she said, "My doctor says 'Here, take this. If you do not see [a] change in *blah blah blah,* make another appointment.' I don't want to hear that."

While Colorado Access was serving as a managed care organization for its CRICC members before March 2010, it had some control and leverage over which providers its members could use because it made the physician payments. Members who did not have a PCP preference were assigned one based on claims history and geography. Colorado Access preferred to assign members to community health centers that it considered its high-volume partners. However, relatively small numbers of CRICC members sought care from any one provider. When there is a high volume of certain patient types — for instance, patients with multiple chronic conditions who live in or near poverty — and a high level of collaboration between care managers and physicians in caring for that type of patient, providers might be expected to change their general approach to treating that particular population. Colorado Access did not believe this was the case with the providers who treated the CRICC members. Since the clinic providers served the entire community, the control group was also likely accessing the same health services as the program group, but there was little expectation of any "contamination" since Colorado Access did not believe that providers changed the way they treated this high-needs population.

After Colorado Access moved to the primary care case management model, CRICC members had to use providers who accepted Medicaid, since the members were then in the fee-for-service system. However, no CRICC members had to change providers as a result of the payer shift. Care managers frequently talked with doctors or clinic staff — typically nurses or medical assistants — to be sure that everyone who was involved in the member's care had the same information. Care managers noted that, in general, they were a welcome addition to the teams that were already working with members and that providers relied on them to fill gaps in services, arrange for resources such as medical equipment, or to confirm that members were filling their prescriptions and taking the correct medications; the relationships were particularly productive in the community health centers once providers understood the role of the care managers.

Furthermore, at the start of CRICC's operations, Colorado Access personnel contacted providers at high-volume clinics and other community providers, such as advocacy groups and social service organizations, to gain support and confirm their ability to accept new clients.

Arranging Services and Resources

Besides addressing members' medical needs, care managers arranged for other services that a member needed, helped members advocate for themselves, and helped them apply for services such as affordable housing, home- and community-based services, assistance to pay bills, food pantry resources, food stamps, subsidized transportation, dental services or eye exams, and shelter arrangements. One member told the evaluation team that her care manager "helps with any problem I might have … Last year, I had trouble with my grandson and she [the care manager] called the adult protection agency to have him removed from my house." On occasion, Colorado Access care managers collaborated with care managers from other programs who also worked with the member. As mentioned above, care managers often addressed social needs before addressing some medical needs because members had to have a stable living environment with reliable food sources before they could begin to work on other areas of their lives, including their medical issues.

Transitional Care

Within Colorado Access there was a separate team — a transition team — that worked exclusively with members who were hospitalized or had been recently discharged from the hospital. The transition team reviewed every discharge, for a CRICC member or otherwise, and in some cases a nurse practitioner from the health plan conducted home visits, typically within 24 hours after discharge. The transition team communicated with care managers before and after each contact. Before March 2010, all CRICC member hospitalizations were preauthorized by Colorado Access so the health plan and care managers would know about hospitalizations immediately, which allowed the transition team to act efficiently. However, after the contract change, Colorado Access was no longer the payer and did not receive notification of hospitalizations automatically. The CRICC members rarely informed their care managers of a hospitalization, so Colorado Access was limited in the discharge planning and follow-up that its care managers could accomplish. To sidestep the decline in information, Colorado Access developed a staff position to conduct a daily hospital census of the health plan's members. However, this approach did not fully replace all the information that was lost in the contract change. Jane's story, in Box 3, demonstrates that the transition team and CRICC care managers worked together, even to engage a newly discovered member.

Comparison of Colorado Access Program with Recommendations from the Medicare Coordinated Care Demonstration

Recall the six structural and operational components of the Medicare Coordinated Care Demonstration that were thought to influence the effectiveness of coordinated care for the Medicare population — targeting, in-person contact, access to timely information about

Box 3

Jane's Story: The Transition Team Steps In

Jane was a 55-year-old female with a history of strokes and congestive heart failure. The strokes affected Jane's cognition and she did not like to speak. The Colorado Access care manager made first contact with Jane in the spring of 2009 after learning about her from the transition team, which worked with Jane after she was hospitalized in April and May 2009 for shortness of breath. In the past, she had been hospitalized or gone to the emergency department primarily because she had failed to refill her prescriptions on time and, as a result, often ran out of medications.

Because Jane was reluctant to speak, her husband provided most of the information for her health assessment. The initial care plan was designed to help Jane reduce her emergency department visits and hospital admissions. Given Jane's reliance on her husband, the care manager worked with both of them in order to maximize the benefit for Jane. The care manager made one home visit, which was atypical. The first step was to get Jane and her husband connected to a primary care provider. The provider, who was based in a clinic, was chosen based on the ability to get a quick appointment rather than on geographic proximity. The care manager gave the provider's phone number to Jane's husband, who set up an appointment for her; an initial appointment in August 2009 was not soon enough for Jane and her husband, so the care manager had it moved up to July 2009. The care manager met the couple at the doctor's office for the first couple of months until they were comfortable and began to fill Jane's prescriptions regularly.

The PCP referred Jane to a cardiologist and an endocrinologist, and the PCP and the endocrinologist contacted the care manager regularly. The care manager set up transportation to appointments until Jane and her husband assumed that responsibility.

The care manager also referred Jane to other resources, including food stamps, the Denver Housing Authority for affordable housing, and long-term caregiver information. However, Jane and her husband never followed through to complete the documents that are necessary to access those resources. About one year after starting in CRICC, Jane graduated from monthly telephone contact with the care manager to less frequent contact, as the care manager and supervisor believed she had met her goals, such as filling her prescriptions on time. Jane's husband, whose involvement is not typical of most CRICC members, checks in with the care manager occasionally.

hospital and ED admissions, close interaction between care managers and primary care providers, services provided, and staffing. Although the MCCD research had not been conducted when CRICC began, the components provide a useful source of comparison. Deviations from these strategies could suggest ways that the coordinated care program could have achieved greater effects.

The Colorado Access CRICC program design was weaker than the strategies suggested by the MCCD findings in several ways. First, the state assigned all eligible Medicaid recipients to CRICC rather than limiting CRICC's patient population to individuals with a high risk of future hospital admissions, which is a group for which coordinated care has been found to be most effective. Although care managers had more contact with individuals who had greater needs, the program design included less contact than more recent research suggests is needed.[47] Second, in-person contact was rarely used. Some care managers had in-person contact with some members, but there was no clear mandate for in-person meetings, and the majority of coordinated care was conducted by telephone. In fact, Colorado Access leadership discouraged home visits for fear of exposing staff to unsafe situations. Finally, although some care managers had a nursing background, the majority of CRICC care managers had experience in a health care–related field but were not nurses.

Nonetheless, the Colorado Access program did align with the MCCD strategies in some ways. Before March 2010, Colorado Access did have timely access to hospital admission and ED information through its health plan authorization system. Care managers instituted a wide variety of interventions, including assessment, care planning, education, coaching on self-management, and enabling access to social supports such as assistance with daily living activities, transportation, and services that are not covered by Medicaid. Furthermore, care managers reported that they had some close interactions with providers, though it was not necessarily face to face; however, all CRICC members who were seen by the same physician were not necessarily assigned to the same care manager, which the MCCD strategies suggest is a good approach.

Implementation Facilitators

Several aspects of Colorado Access's CRICC program were beneficial to its operation. Colorado Access built its CRICC model from an existing care management structure and applied lessons from its earlier demonstration with individuals suffering from depression to the work with the broader group of Medicaid recipients with disabilities. The health plan was flexible enough to allow changes when they were needed. Colorado Access changed its staffing and financing models midstream because the original staffing and financial models used more resources than were provided by the state. The flexibility also extended to the relationships that care managers developed with members. The loose parameters for working with members allowed care managers to adjust the time they spent with each member, and to provide the interventions clients needed. For example, this flexibility allowed care managers to arrange support to pay utility bills, arrange medical transportation, find an affordable optical provider, or translate information provided by a doctor.

[47]Brown (2009).

Implementation Challenges

Several aspects of the CRICC program presented challenges to its implementation. First, and perhaps foremost, is the change in financing structure that affected the type of data that were available to care managers. Prior to March 2010, much of the care managers' work with members was data-driven, based on both real-time claims data and information provided by the member. However, access to real-time data was eliminated with the contract change. Colorado Access was forced to develop alternative arrangements to make up for some of the lost information; these alternatives still left a lot of information unavailable, which required care managers to rely almost entirely on often unreliable self-reports from the members. Second, although not without some benefit, highly individualized care management with loose parameters for frequency of contact and the type of interventions that could be administered may have also hindered implementation. Without clear guidelines, inconsistent services may have been provided across each care manager's caseload and across multiple care managers. Furthermore, research has suggested that care management via telephone is not as effective as care management that requires more in-person contact.[48] Colorado Access's reliance on providing coordinated care by telephone may have diluted the program's effectiveness.

[48]Brown (2009).

Estimated Effects of the Colorado Access Program

This section presents the estimated effects, or *impacts,* of the Colorado Access program on outpatient visits, hospital admissions, emergency department use, and use of prescription medications through the two years after the month of passive enrollment. As noted earlier, information was not available on the effects of the program on social service use, health outcomes, quality of care, or most behavioral health care, all of which may have been influenced by either managed care or coordinated care.

Results are shown separately for each year, since the effects of the program were expected to change over time. In particular, coordinated care was expected to increase health care use in the short term as care managers connected patients with primary care providers and possibly uncovered unmet health care needs. These early efforts as well as efforts by care managers to help people satisfy their social service needs may have improved health and resulted in fewer hospital admissions, although this effect was not expected to happen until later in the program.

Three sets of results are shown. The first compares outcomes for the entire program and control groups. These outcomes represent the average effects of being passively enrolled into managed care. If Colorado Access coordinated care services had a substantial effect on those who received them, those effects will be seen in this set of results. The second set of results is for the high-needs subgroup, who were thought to be the most likely to benefit from coordinated care. The third set of results shows the estimated effects for a group with higher-than-average participation in the Colorado Access managed care program. While only about half of the program group was in the Colorado Access managed care program, about 82 percent of this high-participation subgroup was in the program. By focusing on a group that was more likely to have enrolled in the program, these results come closer to providing estimates of the program itself (rather than the effects of being passively enrolled).

Effects for the Full Sample

Table 4 shows the estimated effects on outpatient visits, including primary care, nonphysician visits, and specialist visits. For each time period, the table shows both the proportion of individuals with any visit and the number of visits (expressed as the number of visits per 1,000 sample members in a month, or "client months").

There is little evidence from these results that the Colorado Access program affected outpatient care. Of the six outcomes examined, there were significant estimated impacts only on the probability of visiting a nonphysician. In the first year (months 1 through 12 in Table 4), for example, 16.7 percent of the program group visited someone other than a physician, compared

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Table 4

Estimated Impacts of CRICC Pilot on Use of Outpatient Services

Outcome	Program Group	Control Group	Difference (Impact)	
Months 1-12 after month of passive enrollment				
Any type of visit with a primary care provider (PCP) (%)	64.9	65.6	-0.7	
Nonphysician visit (%)	16.7	13.1	3.6	***
Specialist visit (%)	59.9	59.0	1.0	
Average number of PCP visits per 1,000 client months	393	384	9	
Average number of nonphysician visits per 1,000 client months	66	53	13	
Average number of specialist visits per 1,000 client months	575	547	28	
Months 13-24 after month of passive enrollment				
Any type of visit with a PCP (%)	61.2	61.6	-0.4	
Nonphysician visit (%)	14.9	12.9	2.0	**
Specialist visit (%)	55.5	54.6	0.9	
Average number of PCP visits per 1,000 client months	349	356	-7	
Average number of nonphysician visits per 1,000 client months	58	52	6	
Average number of specialist visits per 1,000 client months	477	495	-19	
Months 1-24 after month of passive enrollment				
Any type of visit with a PCP (%)	73.0	73.9	-0.9	
Nonphysician visit (%)	24.0	19.5	4.5	***
Specialist visit (%)	69.9	70.2	-0.3	
Average number of PCP visits per 1,000 client months	371	370	1	
Average number of nonphysician visits per 1,000 client months	62	52	9	
Average number of specialist visits per 1,000 client months	526	521	5	
Sample size (total = 5,064)	3,540	1,524		

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

with 13.1 percent of the control group. Results were similar in the second year (months 13 through 24) and across the two years (months 1 through 24). Further investigation of this category of outcomes found that the most common visits were to optometrists, and the program's effect on nonphysician visits was the result of an increase in visits to optometrists. For example, in the first year, 9.6 percent of the program group visited an optometrist at least once compared with 5.4 percent of the control group (not shown). Podiatrists were also visited frequently, but there was no impact on such visits: about 7 percent of both groups visited a podiatrist in the first year (not shown).

It is unclear what to make of the results in Table 4. The first goal of the coordinated care program was to make sure that enrollees had a primary care provider and were receiving care from that provider. As discussed earlier, care managers tried to move individuals from the two groups who were not using their PCP to the group of participants who were using their PCP. Although Table 4 shows that most individuals were using a PCP, it does not provide evidence that more of them were doing so because of the program.

Table 5 shows the estimated effects on hospital admissions and use of the emergency department. Outcomes related to hospital admissions include percentage hospitalized, average number of hospital admissions per 1,000 client months, percentage readmitted to the hospital within 30 days, and average number of inpatient days per 1,000 client months. Outcomes related to ED use include percentage who used the ED and number of ED visits per 1,000 client months. As for outpatient visits, the results are divided into three periods, including the first year (months 1 through 12), the second year (months 13 through 24), and the full two-year period (months 1 through 24). Since reductions in hospital admissions and ED use might take some time to develop, impacts might have been larger later in the follow-up period.

There is little evidence that the program affected hospital admissions and ED use: only one of the estimated effects is significantly different from zero. The average number of admissions per 1,000 client months during the first year was 24.0 for the program group compared with 20.0 for the control group. (Recall that, in the short term, coordinated care might be expected to increase the number of hospital admissions if care managers uncover unmet needs that warrant inpatient care.) However, hospital admissions and ED use were generally quite similar across the program and control groups. For example, in the year following the month of passive enrollment, 16.0 percent of the program group was admitted to the hospital at least once compared with 15.3 percent of the control group.

Table 6 shows the estimated effects on the percentage of individuals who filled a prescription for medication and the number of prescriptions filled per 1,000 sample members in a month. Although there is interest in knowing whether individuals are filling appropriate

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Table 5

Estimated Impacts of CRICC Pilot on Hospital Admissions and Emergency Department Use

Outcome	Program Group	Control Group	Difference (Impact)	
Months 1-12 after month of passive enrollment				
Ever admitted to a hospital (%)	16.0	15.3	0.7	
Readmitted within 30 days (%)	3.5	3.1	0.4	
Ever used an emergency department (ED) (%)	40.5	39.8	0.7	
Average number of admissions per 1,000 client months	24	20	4	**
Average number of inpatient days per 1,000 client months	166	145	21	
Average number of ED visits per 1,000 client months	109	108	1	
Months 13-24 after month of passive enrollment				
Ever admitted to a hospital (%)	12.7	13.1	-0.4	
Readmitted within 30 days (%)	2.4	2.0	0.4	
Ever used an ED (%)	37.6	36.1	1.5	
Average number of admissions per 1,000 client months	18	18	0	
Average number of inpatient days per 1,000 client months	113	113	0	
Average number of ED visits per 1,000 client months	97	89	8	
Months 1-24 after month of passive enrollment				
Ever admitted to a hospital (%)	23.3	23.0	0.3	
Readmitted within 30 days (%)	5.2	4.8	0.4	
Ever used an ED (%)	52.8	51.9	0.9	
Average number of admissions per 1,000 client months	21	19	2	
Average number of inpatient days per 1,000 client months	140	129	10	
Average number of ED visits per 1,000 client months	103	99	4	
Sample size (total = 5,064)	3,540	1,524		

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

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Table 6

Estimated Impacts of CRICC Pilot on Filling Prescription Medications

Outcome	Program Group	Control Group	Difference (Impact)
Months 1-12 after month of passive enrollment			
Filled any prescription medication (%)	76.8	75.9	0.8
Average number of prescription medications filled per 1,000 client months	3,311	3,289	22
Months 13-24 after month of passive enrollment			
Filled any prescription medication (%)	68.1	67.1	1.0
Average number of prescription medications filled per 1,000 client months	3,110	2,986	124
Months 1-24 after month of passive enrollment			
Filled any prescription medication (%)	80.2	79.8	0.4
Average number of prescription medications filled per 1,000 client months	3,210	3,137	73
Sample size (total = 5,064)	3,540	1,524	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

prescriptions for their diagnosed conditions, it was expected that care managers would monitor the use of prescription medications and help ensure that individuals were refilling prescriptions as needed.

Despite this expectation, there is little evidence that the Colorado Access program affected the filling of prescription medications. For example, in the first year following the month of passive enrollment, 76.8 percent of the program group and 75.9 percent of the control group filled at least one prescription, and about 3,300 prescriptions were filled per 1,000 client months for each group — findings that are not statistically significant. It is possible, of course, that care managers helped individuals receive and adhere to an appropriate set of prescription medications, which may have resulted in additional prescriptions filled for some people but a reduction in filled prescriptions for others. It is difficult to assess this possibility for a diverse population such as the one in this study, especially because guidelines are unavailable for many combinations of chronic conditions faced by sample members.

Effects for the High-Needs Subgroup

Tables 7 through 9 show estimated effects for the 20 percent of health care users who were considered to have the highest needs. Most individuals in this group had multiple chronic conditions and they were at the greatest risk of having uncoordinated care in the fee-for-service system, particularly if they were not using the primary care providers to whom they had been assigned. As a result, the effects of coordinated care were hypothesized to be the greatest for this group. It is possible, however, that these high-needs users are so sick that coordinated care cannot reduce their health care use. In addition, because this group represents only 20 percent of the study sample, any effects would have to be large to be considered statistically significant.

As expected, this group uses much more health care than the full sample. For example, they made over 50 percent more visits to primary care providers in the first year (639 per month per 1,000 individuals compared with 393 for the full program group) and to specialists (873 compared with 575), as shown in Table 7 for the high-needs subgroup and Table 4 for the full program group. However, impacts for this group are generally similar to impacts for the full sample. There are a few statistically significant differences between the program group and control group (shown in Table 8), but most of the estimated effects are not statistically significant.

Effects Among Colorado Access Enrollees

Given that a substantial portion of the program group never enrolled in Colorado Access managed care because they opted out of managed care or chose a different managed care provider, estimates using the full sample understate the effects of the Colorado Access program (although they provide valid estimates of the effects of passive enrollment). A natural question, therefore, is whether the effects were larger for those who were enrolled. This section investigates that question.

To understand the effects for those who enrolled in Colorado Access managed care, information that was available before random assignment was conducted was used to find a subgroup of the program group with high enrollment rates in Colorado Access managed care.[49]

[49]It would be natural to compare program group members who enrolled in the program with the entire control group. Unfortunately, enrollees are likely to differ from others in unobserved ways. For that reason, attempts to match enrollees to similar control group members failed to yield unbiased estimates and are not presented in this report.

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Table 7

Estimated Impacts of CRICC Pilot on Use of Outpatient Services, High-Needs Subgroup

Outcome	Program Group	Control Group	Difference (Impact)
Months 1-12 after month of passive enrollment			
Any type of visit with a primary care provider (PCP) (%)	80.8	81.6	-0.9
Nonphysician visit (%)	29.3	26.1	3.3
Specialist visit (%)	75.9	76.8	-0.9
Average number of PCP visits per 1,000 client months	639	607	31
Average number of nonphysician visits per 1,000 client months	162	149	12
Average number of specialist visits per 1,000 client months	873	760	113
Months 13-24 after month of passive enrollment			
Any type of visit with a PCP (%)	74.3	73.7	0.6
Nonphysician visit (%)	25.3	28.7	-3.4
Specialist visit (%)	71.9	68.0	3.9
Average number of PCP visits per 1,000 client months	577	564	13
Average number of nonphysician visits per 1,000 client months	145	127	18
Average number of specialist visits per 1,000 client months	780	794	-14
Months 1-24 after month of passive enrollment			
Any type of visit with a PCP (%)	85.4	86.0	-0.7
Nonphysician visit (%)	38.8	37.3	1.5
Specialist visit (%)	84.4	84.7	-0.2
Average number of PCP visits per 1,000 client months	608	586	22
Average number of nonphysician visits per 1,000 client months	153	138	15
Average number of specialist visits per 1,000 client months	826	777	49
Sample size (total = 1,013)	701	312	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * =10 percent.

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Table 8

Estimated Impacts of CRICC Pilot on Hospital Admissions and Emergency Department Use, High-Needs Subgroup

Outcome	Program Group	Control Group	Difference (Impact)	
Months 1-12 after month of passive enrollment				
Ever admitted to a hospital (%)	26.4	25.9	0.6	
Readmitted within 30 days (%)	6.4	4.2	2.2	
Ever used an emergency department (ED) (%)	52.9	55.9	-3.0	
Average number of admissions per 1,000 client months	43	32	11	*
Average number of inpatient days per 1,000 client months	271	207	64	
Average number of ED visits per 1,000 client months	170	195	-24	
Months 13-24 after month of passive enrollment				
Ever admitted to a hospital (%)	23.9	20.4	3.4	
Readmitted within 30 days (%)	5.0	2.8	2.3	
Ever used an ED (%)	50.2	45.5	4.7	
Average number of admissions per 1,000 client months	35	31	5	
Average number of inpatient days per 1,000 client months	221	212	9	
Average number of ED visits per 1,000 client months	157	153	4	
Months 1-24 after month of passive enrollment				
Ever admitted to a hospital (%)	39.7	35.5	4.1	
Readmitted within 30 days (%)	9.9	6.3	3.5	*
Ever used an ED (%)	65.7	65.2	0.5	
Average number of admissions per 1,000 client months	39	31	8	*
Average number of inpatient days per 1,000 client months	246	210	37	
Average number of ED visits per 1,000 client months	163	174	-10	
Sample size (total = 1,013)	701	312		

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

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Table 9

Estimated Impacts of CRICC Pilot on Filling Prescription Medications, High-Needs Subgroup

Outcome	Program Group	Control Group	Difference (Impact)
Months 1-12 after month of passive enrollment			
Filled any prescription medication (%)	91.7	91.5	0.2
Average number of prescription medications filled per 1,000 client months	5,928	5,986	-58
Months 13-24 after month of passive enrollment			
Filled any prescription medication (%)	80.6	78.2	2.4
Average number of prescription medications filled per 1,000 client months	5,481	5,221	260
Months 1-24 after month of passive enrollment			
Filled any prescription medication (%)	93.1	93.0	0.1
Average number of prescription medications filled per 1,000 client months	5,705	5,604	101
Sample size (total = 1,013)	701	312	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

Because this group is defined by pre–random assignment characteristics, a similar group could be located among the control group using those same characteristics. If the program is effective, estimated differences for program group members and control group members in this high-enrollment subgroup should be larger than for the full sample.[50]

[50]To define the subgroups, a logistic regression was run using program group members to determine which baseline characteristics were associated with enrollment in the Colorado Access program. The dependent variable was whether the person had been enrolled in Colorado Access managed care for at least one month following random assignment. Explanatory variables included the list of chronic conditions and demographic characteristics shown in Table 2 as well as indicators of the county where the person lived upon entering the study. Results of the logistic regression were used to calculate a predicted probability of enrollment for each person in the study. Program group and control group members with predicted probabilities above the median were placed in the subgroup that had a high probability of enrollment, while other individuals were placed in the subgroup that had a low probability of enrollment. Because the predicted probability was calculated using baseline information, it preserves the benefits of the intent-to-treat analysis. The results are consequently unbiased estimates of the program's effects for the two subgroups.

Table 10 shows the results of this analysis for the two years following passive enrollment. Results are presented for both the high- and low-participation subgroups.

The logic behind this analysis is that the high-participation subgroup was more likely to have received program services; consequently, any evidence that the program was effective would be seen for this subgroup. Table 10 shows one statistically significant impact estimate for the high-participation subgroup: in the year after the month of passive enrollment, members of the high-participation program subgroup had an average of 21 hospital admissions per 1,000 clients per month, an increase of six admissions compared with the high-participation control subgroup. Because only this outcome differs significantly between program and control group members, the results suggest that the effects of the Colorado Access program for this high-participation subgroup are likely to be small.

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Table 10

Estimated Impacts of CRICC Pilot on Use of Health Care Services, by Predicted Probability of Participation in Colorado Access Managed Care

Outcome	High-Participation Subgroup			Low-Participation Subgroup		
	Program Group	Control Group	Difference (Impact)	Program Group	Control Group	Difference (Impact)
Months 1-12 after month of passive enrollment						
Had any type of visit with a primary care provider (PCP) (%)	58.3	58.9	-0.5	71.5	72.5	-1.0
Ever admitted to a hospital (%)	13.6	11.4	2.2	18.4	19.3	-0.9
Ever used an emergency department (ED) (%)	39.4	38.0	1.4	41.7	41.4	0.3
Average number of PCP visits per 1,000 client months	333	316	18	450	459	-9
Average number of hospital admissions per 1,000 client months	21	15	6 **	27	26	2
Average number of ED visits per 1,000 client months	109	102	7	109	115	-6
Months 13-24 after month of passive enrollment						
Had any type of visit with a PCP (%)	55.5	56.7	-1.2	66.8	66.9	-0.1
Ever admitted to a hospital (%)	10.7	11.4	-0.7	14.9	14.7	0.2
Ever used an ED (%)	36.9	34.0	2.9	38.4	38.3	0.1
Average number of PCP visits per 1,000 client months	312	306	5	387	404	-17
Average number of hospital admissions per 1,000 client months	15	15	0	21	20	1
Average number of ED visits per 1,000 client months	99	85	13	96	91	6
Months 1-24 after month of passive enrollment						
Had any type of visit with a PCP (%)	66.8	69.0	-2.2	79.2	79.0	0.2
Ever admitted to a hospital (%)	19.7	18.6	1.1	26.9	27.5	-0.6
Ever used an ED (%)	51.1	49.1	2.1	54.6	54.6	0.0
Average number of PCP visits per 1,000 client months	323	311	11	418	431	-13
Average number of hospital admissions per 1,000 client months	18	15	3	24	23	2
Average number of ED visits per 1,000 client months	104	94	10	103	103	0
Sample size (N = 5,064)	1,776	756		1,764	768	

SOURCE: MDRC calculations based on Medicaid claims data from the Colorado Department of Health Care Policy and Financing and on Colorado Access encounter data.

NOTE: A two-tailed t-test was applied to differences between the outcomes for the program and control groups. Statistical significance levels are indicated as follows: *** = 1 percent, ** = 5 percent, * = 10 percent.

Discussion

This document presents final estimates of the effects on health care use of a two-year pilot coordinated care program operated by Colorado Access for Medicaid recipients with disabilities. In general, the results provide little evidence that the program affected health care use. It did not appear to increase the use of primary care or reduce hospital admissions or use of the emergency department, which were some of the primary targeted outcomes of the intervention. The results do suggest that the intervention increased the use of nonphysician care, particularly optometrists.

The lack of effectiveness may reflect some challenges that were faced in implementing the program, as well as some features of the program design that recent research suggests may not be optimal. First, the focus on providing coordinated care by telephone and the use of monthly or less frequent contact for most individuals runs contrary to recent evidence that suggests that intensive in-person meetings between care managers and patients may be needed for a program to be effective. Second, a contract change limited the ability of care managers to learn quickly about hospital admissions and emergency department use. Since the transition from hospital to home is considered a time when patients are most amenable to changing their behavior, this change limited the intervention's effect on managing those transitions. Finally, care managers indicated that they had great difficulty enrolling individuals in coordinated care services because of poor contact information. Each of these challenges could have been addressed with additional resources or data, and they suggest ways that future coordinated care programs might be made more effective.

Although implementation challenges provide reasons why the program may have been ineffective, there are several reasons to be cautious about the results. First, only about three-fourths of those who were passively enrolled in managed care enrolled in the Colorado Access managed care program, and fewer received coordinated care services. As a result, the true effects of the program were larger than indicated by intent-to-treat estimates that compared outcomes for all program and control group members. Notably, the large size of the study sample — more than 5,000 Medicaid recipients — allowed the study to detect relatively modest impacts. Thus, the lack of statistically significant impacts suggests that the Colorado Access program had quite small effects at best. Moreover, an analysis of those who were most likely to enroll in the Colorado Access program did not find larger and more consistent effects.

It is also possible that program and control group members had similar health care use following random assignment, because the Colorado Access program changed the behavior of high-volume clinics that serve many individuals in both groups. Such changes in provider behavior may have improved the quality of care for both groups but left the difference between the two groups small. If that occurred, it suggests that the efforts of care managers to help

individual Colorado Access members manage their conditions did not produce changes in their health care choices.

Finally, a two-year time frame might be too short for effects of a program such as this one to be seen. A recent study of care management for Medicaid recipients in Los Angeles and Alameda Counties, for example, found little effect in the first two years of the program but did find evidence of reduced costs for asthma patients (but not other patients) in the third year.[51] States may have to provide an even greater up-front investment in coordinated care in order to generate long-term savings.

[51]Kominski et al. (2011).

Appendix

Outcome Measures Used in This Report

The main outcome measures used in this report are emergency department (ED) visits, hospital inpatient care, outpatient care, and prescription drug use.

ED visits. Claims from institutional and professional files were used to categorize ED visits. More specifically, ED visits were selected from institutional claims with a revenue code of 450 (emergency room) or 459 (other emergency room) and professional claims with Current Procedural Terminology (CPT) medical procedure codes between 99281 and 99288 (ED visits).

Admitted to hospital. Claims from institutional files with room and board charges (revenue codes between 100 and 219) were first selected. Additionally, only those room and board claims with a bill type code (which contains the bill field from the UB_92 claim form) between 111 and 115 or 117 (hospital inpatient) were considered to be an inpatient stay.

Readmitted within 30 days. Individuals with a hospital inpatient visit start date within 30 days of a previous inpatient visit's end date were categorized as readmitted to the hospital within 30 days.

Outpatient care. Claims from professional data were used to classify outpatient care. Professional claims that were categorized as ED visits (that is, with a CPT medical procedure code between 99281 and 99288) were excluded from outpatient care. To classify the type of outpatient care, information from the National Provider Identifier (NPI) registry from the Centers for Medicare and Medicaid Services, which provides a standard unique health identifier for health care providers, was merged onto the professional claims. If the NPI classification was not available, then provider type code and provider specialty code from the professional data were used.

Primary care provider visits. If provider type from the NPI data was available, then primary care provider (PCP) visits were classified using the following taxonomy codes: family medicine (207Q00000X [general], 207QA0000X [adolescent], 207QA0505X [adult], 207QG0300X [geriatric]); internal medicine (207R00000X [general], 207RA0000X [adolescent], 207RG0300X [geriatric]), obstetrics and gynecology (207V00000X [general], 207VG0400X [gynecology], 207VX0000X [obstetrics]), public health and general preventive medicine (2083P0901X), general practice (208D00000X), and community health center/clinic (261Q00000X, 261QC1500X, 261QC1800X, 261QF0400X, 261QH0100X, 261QM1000X, 261QP0904X, 261QP0905X, 261QP2300X).

If provider type from the NPI data was not available, then provider type code and provider specialty code were used to categorize PCP visits. In the Colorado Department of Health Care Policy and Financing (HCPF) data, visits with a provider type code of federally qualified health center (32) or rural health clinic (45) were considered PCP visits. Additionally, claims were classified as PCP visits if they had provider type codes of physician (05) or osteopath (26)

and provider specialty codes of general practice (01), internal medicine (15), obstetrics and gynecology (53), or family practice (77). In the Colorado Access data, visits with a provider type code of PCP (PC) or obstetrics and gynecology (OB) were classified as primary care. Also, provider type codes of professional (PR) and specialty codes of internal medicine (IM), family practice (FP), obstetrics and gynecology (OB), and general medicine (GP) were considered primary care.

Nonphysician visits. If provider type from the NPI data was available, then nonphysician visits were classified using the following taxonomy codes: chiropractor (111N00000X-111NX0800X); dietician/nutritionist (132700000X-136A00000X); optometrist/orthoptist (152W00000X-156FX1900X); podiatrist/podiatric assistant (211D00000X-213ES0131X); respiratory, developmental, occupational, and rehabilitation therapies (221700000X-229N00000X); speech/hearing (231H00000X-237700000X); and other clinic or health center (speech/hearing [261QH0700X], podiatric [261QP1100X], physical therapy [261QP2000X], and rehabilitation [261QR0400X-261QR0404X]).

If provider type from the NPI data was not available, then provider type code and provider specialty code were used to categorize nonphysician visits. In the HCPF data, provider type codes of podiatrist (06), optometrist (07), optician (08), physical therapist (17), audiologist (19), nonphysician practitioner (24, 25), speech therapist (27), and occupational therapist (28) were used. In the Colorado Access data, provider type codes of podiatrist (PD), vision provider (VP), and ancillary providers (AC) with a specialty of physical therapy (PT) or audiology (AU) were categorized as nonphysician visits.

Specialist visits. If provider type from the NPI data was available, then specialist visits were classified using the following taxonomy codes: phlebology (202K00000X); neuromusculoskeletal and sports medicine (204C00000X, 204D00000X); oral and maxillofacial surgery (204E00000X); transplant surgery (204F00000X); allergy and immunology (207K00000X-207KI0005X); anesthesiology (207L00000X-207LP3000X); dermatology (207N00000X-207NS0135X); emergency medicine (207P00000X-207PT0002X); internal medicine with a specialty in allergy and immunology (207RA0201X, 207RI0001X), bariatric medicine (207RB0002X), cardiovascular disease (207RC0000X), clinical cardiac electrophysiology (207RC0001X), critical care medicine (207RC0200X), endocrinology, diabetes, and metabolism (207RE0101X), gastroenterology (207RG0100X), hematology (207RH0000X, 207RH0003X), hospice and palliative medicine (207RH0002X), hepatology (207RI0008X, 207RT0003X), interventional cardiology (207RI0011X), infectious disease (207RI0200X), MRI (207RM1200X), nephrology (207RN0300X), pulmonary disease (207RP1001X), rheumatology (207RR0500X), sports medicine (207RS0010X), sleep medicine (207RS0012X), or oncology (207RX0202X); medical genetics (207SC0300X-207SM0001X); neurological surgery (207T00000X); nuclear medicine (207U00000X-207UN0903X); ophthalmology

(207W00000X); orthopedic surgery (207X00000X-207XX0801X); otolaryngology (207Y00000X-207YX0905X); pathology (207ZB0001X-207ZP0213X); physical medicine and rehabilitation (208100000X-2081S0010X); plastic surgery (208200000X-2082S0105X); radiology (2085B0100X-2085U0001X); surgery (208600000X-2086X0206X); urology (208800000X, 2088P0231X); colon and rectal surgery (208C00000X); thoracic surgery (208G00000X); clinical pharmacology (208U00000X); pain medicine (208VP0000X, 208VP0014X); legal medicine (209800000X); clinic/health center with various specialties, including outpatient surgery (261QA1903X, 261QM1300X, 261QM2500X, 261QS0112X, 261QS0132X, 261QX0200X, 261QX0203X); family medicine with a specialty in bariatric medicine (207QB0002X), hospice/palliative care (207QH0002X), sports medicine (207QS0010X), and sleep medicine (207QS1201X); obstetrics and gynecology with a specialty in bariatric medicine (207VB0002X), critical care (207VC0200X), reproductive endocrinology (207VE0102X), hospice and palliative medicine (207VH0002X), maternal and fetal medicine (207VM0101X), and gynecologic oncology (207VX0201X); and preventive medicine with a specialty in aerospace medicine (2083A0100X), undersea and hyperbaric medicine (2083P0011X), occupational-environmental medicine (2083P0500X), sports medicine (2083S0010X), medical toxicology (2083T0002X), and occupational medicine (2083X0100X).

If provider type from the NPI data was not available, then provider type code and provider specialty code were used to categorize nonphysician visits. In the HCPF data, visits with a provider type code of physician (05) or osteopath (26) and one of the following provider specialty codes were considered specialists: emergency medicine (05), cardiovascular disease (12), dermatology (13), gastroenterology (14), physical medicine and rehabilitation (17), pulmonary medicine (19), child psychiatry (21), neurology (22), pathology (31), radiology (32), anesthesiology (41), endocrinology (42), general surgery (51), neurological surgery (52), ophthalmology (54), orthopedic surgery (55), otolaryngology (56), plastic surgery (57), thoracic surgery (58), urology (59), oncology (60), infectious disease (72), peripheral vascular disease/surgery (74), cardiovascular surgery (91), nephrology (92), pediatric allergy (A2), pediatric cardiology (A3), orthopedics (A9), traumatic surgery (B7), and physiatrist (C5). In the Colorado Access data, visits with a provider type code of orthopedic (OR) or ear, nose, and throat (EN) were considered specialist visits. Also included were claims with a provider type code of ancillary provider (AC) and a provider specialty of anesthesiology (AN), pathology (PA), or radiology (RA). Additionally, claims with a provider type code of professional (PR) and one of the following provider specialties were considered specialist visits: anesthesiology (AN), critical care medicine (CC), cardiovascular disease (CD), multispecialty clinic (CL), clinical nurse specialty (CNS), dermatology (DR), endocrinology/diabetes/metabolic (ED), emergency medicine (EM), gastroenterology (GE), geriatric medicine (GM), surgery (GS), surgery of the hand (HD), hospice and palliative care (HPM), infectious disease (ID), independent laboratory (IL), licensed professional counselor (LPC), medical (MD), neurology (NE), nephrology (NK),

neurological surgery (NS), medical oncology and hematology (OH, ON), orthopedic surgery (OR), pathology (PA), pain medicine (PG), plastic surgery (PL), physical medicine and rehabilitation (PMR), pulmonary disease (PU), rheumatology (RH), radiation oncology (RO), surgical assistant (SA), thoracic surgery (TS), undersea and hyperbaric medicine (UM), urology (UR), and vascular surgery (VS).

Prescription medications. Claims from prescription drug files were used to classify the use of prescription medications.

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MDRC is a nonprofit, nonpartisan social and education policy research organization dedicated to learning what works to improve the well-being of low-income people. Through its research and the active communication of its findings, MDRC seeks to enhance the effectiveness of social and education policies and programs.

Founded in 1974 and located in New York City and Oakland, California, MDRC is best known for mounting rigorous, large-scale, real-world tests of new and existing policies and programs. Its projects are a mix of demonstrations (field tests of promising new program approaches) and evaluations of ongoing government and community initiatives. MDRC's staff bring an unusual combination of research and organizational experience to their work, providing expertise on the latest in qualitative and quantitative methods and on program design, development, implementation, and management. MDRC seeks to learn not just whether a program is effective but also how and why the program's effects occur. In addition, it tries to place each project's findings in the broader context of related research — in order to build knowledge about what works across the social and education policy fields. MDRC's findings, lessons, and best practices are proactively shared with a broad audience in the policy and practitioner community as well as with the general public and the media.

Over the years, MDRC has brought its unique approach to an ever-growing range of policy areas and target populations. Once known primarily for evaluations of state welfare-to-work programs, today MDRC is also studying public school reforms, employment programs for ex-offenders and people with disabilities, and programs to help low-income students succeed in college. MDRC's projects are organized into five areas:

- Promoting Family Well-Being and Children's Development
- Improving Public Education
- Raising Academic Achievement and Persistence in College
- Supporting Low-Wage Workers and Communities
- Overcoming Barriers to Employment

Working in almost every state, all of the nation's largest cities, and Canada and the United Kingdom, MDRC conducts its projects in partnership with national, state, and local governments, public school systems, community organizations, and numerous private philanthropies.