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Lessons from Medicare's Demonstration Projects on Disease Management and Care Coordination

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Lessons from Medicare's Demonstration Projects on Disease Management and Care Coordination

Abstract

This paper summarizes the results of Medicare demonstrations of disease management and care coordination programs. Such programs seek to improve the health care of people who have chronic conditions or whose health care is expected to be particularly costly, and they seek to reduce the costs of providing health care to those people. In six major demonstrations over the past decade, Medicare's administrators have paid 34 programs to provide disease management or care coordination services to beneficiaries in Medicare's fee-for-service sector. All of the programs in those demonstrations sought to reduce hospital admissions by maintaining or improving beneficiaries' health, and that reduction was a key mechanism through which they expected to reduce Medicare expenditures. On average, the 34 programs had no effect on hospital admissions or regular Medicare expenditures (that is, expenditures before accounting for the programs' fees). There was considerable variation in the estimated effects among programs, however. Programs in which care managers had substantial direct interaction with physicians and significant in-person interaction with patients were more likely to reduce hospital admissions than programs without those features. After accounting for the fees that Medicare paid to the programs, however, Medicare spending was either unchanged or increased in nearly all of the programs.

Introduction

Federal spending on Medicare is projected to increase substantially in the coming decades, exerting significant strains on the federal budget. At the same time, there are widespread concerns about the quality and efficiency of care received by beneficiaries. Beneficiaries with chronic conditions such as heart disease and diabetes often do not receive care that is consistent with recommended standards, many do not follow prescribed self-care regimens, and there is typically little or no coordination among the providers who care for them. Those concerns are not limited to Medicare but extend to the U.S. health care system more generally. Some experts contend that disease management and care coordination programs have the potential to both improve quality of care and reduce health care spending—particularly for people with chronic conditions or high expected health care costs.

Disease management and care coordination are widely used by private health insurers, but their application in the Medicare fee-for-service program has been limited to demonstrations. There has been considerable interest in exploring the potential effects of such programs in Medicare because chronic conditions are common among the Medicare population and beneficiaries with such conditions account for a substantial share of Medicare expenditures. For example, in 2002, half of Medicare beneficiaries were treated for five or more chronic conditions, and they accounted for three-quarters of all Medicare expenditures.[1]

Over the past decade, Medicare's administrators have conducted six major demonstrations that have tested various approaches to disease management and care coordination. All of the programs in those demonstrations sought to reduce hospital admissions by maintaining or improving beneficiaries' health, and that reduction was a key mechanism through which they expected to reduce Medicare expenditures. On average, the 34 programs had no effect on hospital admissions or *regular* Medicare expenditures (that is, expenditures before accounting for the programs' fees). There was considerable variation in the estimated effects among programs, however. Programs in which care managers had substantial direct interaction with physicians and significant in-person interaction with patients were more likely to reduce hospital admissions than programs without those features. After accounting for the fees that Medicare paid to the programs, however, Medicare spending either was unchanged or was higher in nearly all of the programs.[2]

Disease Management and Care Coordination in the Private Sector

Nearly all private health plans offer disease management or care coordination programs, and most major employers purchase such services as part of their employee health insurance plans. Insurers often contract with companies that offer disease management and care coordination

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[1] Kenneth E. Thorpe and David H. Howard, "The Rise in Spending Among Medicare Beneficiaries: The Role of Chronic Disease Prevalence and Changes in Treatment Intensity," *Health Affairs*, Web First, August 22, 2006.

[2] The findings of another set of Medicare demonstrations, which tested value-based payment approaches, are discussed in detail in Lyle Nelson, *Lessons from Medicare's Demonstration Projects on Value-Based Payment*, Congressional Budget Office Working Paper 2012-2 (January 2012). For additional information on the lessons of both sets of demonstrations, see Congressional Budget Office, *Lessons from Medicare's Demonstration Projects on Disease Management, Care Coordination, and Value-Based Payment*, Issue Brief, January 2012.

services, although some insurers provide such services themselves. Employers purchase those services because of their potential to improve health outcomes and contain costs, although there often is little evidence regarding such services' effectiveness.[3]

Disease management programs vary widely but typically include some or all of the following elements: educating patients about their condition to help them monitor their symptoms more effectively and follow self-care regimens; helping motivate patients to make beneficial behavioral changes; monitoring patients' symptoms and their adherence to treatment recommendations; monitoring providers' adherence to evidence-based practice guidelines; and providing feedback to patients' primary care physicians.[4] The terms *care coordination* and *disease management* are often used interchangeably.[5] Some experts have drawn several distinctions, however.[6] Although care coordination programs typically share some features with disease management programs, they often include additional elements to improve the flow of information among providers, assist patients with transitions between care settings (for example, as patients are discharged from a hospital to home or another setting), and help patients access medical and social support services. Moreover, disease management programs are typically focused on a specific chronic disease and encourage enrollees to follow a standard set of self-care strategies, whereas care coordination programs typically address patients' multiple chronic conditions and are more tailored to the needs of individual enrollees.

Disease management and care coordination programs vary in the populations they target and in the nature and intensity of services provided. The services are typically provided by nurses who function as care managers. Some programs seek to serve all enrollees in a health plan who have a particular condition, whereas others focus on more severely ill enrollees. Programs often classify enrollees by severity of illness and tailor their services accordingly. Low-intensity services typically include mass mailings and prerecorded telephone messages, medium-intensity services include periodic telephone calls from nurse care managers, and high-intensity services include more frequent telephone calls and in-person visits from care managers.

In recent years, some health plans have implemented programs designed to assist patients as they make transitions from one setting to another—such as from a hospital to home.[7] Such programs are designed to ensure that patients understand the instructions they have been given and that they know whom to contact if they have questions or if their symptoms worsen. The programs

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[3] Glen P. Mays, Melanie Au, and Gary Claxton, "Convergence and Dissonance: Evolution in Private-Sector Approaches to Disease Management and Care Coordination," *Health Affairs*, vol. 26, no. 6, November/December 2007, pp. 1683–1691.

[4] See Deborah Peikes and others, *Third Report to Congress on the Evaluation of the Medicare Coordinated Care Demonstration* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, January 2008), p. 5, www.policyarchive.org/handle/10207/bitstreams/15737.pdf.

[5] The term *care coordination* is also often used interchangeably with *care management*. See Agency for Healthcare Research and Quality, *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies, Volume 7: Care Coordination*, AHRQ Publication No. 04(07)-0051-7, June 2007, www.ahrq.gov/clinic/tp/caregaptp.htm.

[6] Peikes and others, *Third Report to Congress on the Evaluation of the Medicare Coordinated Care Demonstration*; and Mays and others, "Convergence and Dissonance."

[7] For a description of some programs, see America's Health Insurance Plans, *Innovations in Reducing Preventable Hospital Admissions, Readmissions, and Emergency Room Use* (June 2010), www.ahipresearch.org/pdfs/innovations2010.pdf.

vary, but nurses typically meet with patients in the hospital to discuss their care plans and then contact them periodically after they are discharged.

Disease management and care coordination programs vary in the extent to which patients' physicians are involved. Many programs have little or no interaction with the patients' physicians. At the other extreme, some large integrated health systems have developed programs in which care managers work in physicians' practices and are part of the care team. The health systems that have developed such integrated programs are typically part of a health maintenance organization or are paid by one or more health plans to provide such services.

Disease management and care coordination programs have the potential to improve health and reduce costs in several ways. By helping patients adhere to recommended diet, exercise, and other self-care regimens; teaching them how to recognize and respond to signs of worsening health; and encouraging them to obtain routine medical tests that are recommended for people with their condition, the programs have the potential to prevent exacerbations of chronic disease and thus reduce hospital admissions, emergency room visits, and the use of other costly health care services. In addition, many programs monitor patients' prescription drug regimens to identify potential adverse drug interactions and work with patients or their physicians to address such issues. Moreover, to the extent that programs improve coordination among providers, they could improve care and reduce duplication.

The Medicare Demonstrations

Over the past decade, the federal government has conducted six major demonstrations of disease management and care coordination for beneficiaries in the Medicare fee-for-service program. The demonstrations have tested a variety of interventions aimed at improving the care of beneficiaries with chronic conditions or high expected health care costs. A total of 34 programs have participated in the demonstrations. They were sponsored by a variety of organizations, including disease management companies, hospital-based health systems, and other types of health care providers. For some demonstrations, health care providers formed partnerships with disease management companies and other vendors.

The six demonstrations are as follows (see Table 1):

- The Demonstration of Care Management for High-Cost Beneficiaries, in which six programs vary widely in terms of their interventions and target populations;
- The Medicare Coordinated Care Demonstration, in which 15 programs used a broad range of interventions and varied in the chronic diseases they targeted;
- The Medicare Health Support Pilot Program, in which eight programs served beneficiaries with congestive heart failure or diabetes;
- The Demonstration of Disease Management for Dual Eligible Beneficiaries, in which one program served beneficiaries in certain counties in Florida who had certain chronic conditions and were enrolled in both Medicare and Medicaid;

Table 1.
Demonstrations of Disease Management and Care Coordination

Demonstration	Number of Programs	Fees at Risk?	Target Population
Demonstration of Care Management for High-Cost Beneficiaries	6	Yes	Varies by program; all target beneficiaries with high predemonstration costs for Medicare, high predicted costs, or both; some also target beneficiaries with particular chronic conditions
Medicare Coordinated Care Demonstration	15	No	Varies by program; most commonly targeted conditions are CHF, CAD, chronic lung disease, and diabetes
Medicare Health Support Pilot	8	Yes	Beneficiaries with CHF or diabetes
Demonstration of Disease Management for Dual Eligible Beneficiaries	1	Yes	Dual eligible beneficiaries with CHF, diabetes, or CAD
Demonstration of Informatics for Diabetes Education and Telemedicine	1	No	Beneficiaries with diabetes
Demonstration of Disease Management for Severely Chronically Ill Beneficiaries	3	Yes	Beneficiaries with advanced-stage CHF, diabetes, or CAD

Source: Author's review of information in the sources listed in Appendix B.
Note: CHF = congestive heart failure; CAD = coronary artery disease.

- The Demonstration of Informatics for Diabetes Education and Telemedicine, in which one program placed "telemedicine units" in beneficiaries' homes that enabled them to conduct audiovisual conferences with their care managers and electronically transmit physiological data to them;
- The Demonstration of Disease Management for Severely Chronically Ill Beneficiaries, in which three programs combined disease management with a comprehensive prescription drug benefit.

Four of the demonstrations have ended; two are still under way as a result of extensions granted by the Centers for Medicare & Medicaid Services (CMS) (see Table 2). In both cases, only some of the original programs are still participating.

Table 2.

Status of the Demonstrations of Disease Management and Care Coordination

Demonstration	Start Date	Originally Scheduled Period	Status
Demonstration of Care Management for High-Cost Beneficiaries	Oct. 2005 to Aug. 2006	3 years	Two programs were extended for three years and are still operating, two ended after three years, and two ended early
Medicare Coordinated Care Demonstration	April 2002 to Sept. 2002	4 years	Eleven programs were granted two-year extensions (one was granted another extension and still operates), three programs ended after the original four-year demonstration period, and one ended five months early
Medicare Health Support Pilot	Aug. 2005 to Jan. 2006	3 years	Three programs completed three years of operations; the other five withdrew early (after operating for periods ranging from 17 months to 33 months)
Demonstration of Disease Management for Dual Eligible Beneficiaries	Jan. 2005	3 years	The program was extended for up to three years under modified eligibility criteria, but CMS later ended the demonstration because of projected financial losses
Demonstration of Informatics for Diabetes Education and Telemedicine	Feb. 2000	4 years	The program was extended for four years (despite a lack of favorable results for the first four years) and ended in February 2008
Demonstration of Disease Management for Severely Chronically Ill Beneficiaries	Feb. 2004 to June 2004	3 years	The demonstration ended early for all three programs, which had operated for periods ranging from 15 months to 25 months

Source: Author's review of information in the sources listed in Appendix B.
Note: CMS = Centers for Medicare & Medicaid Services.

In all of the demonstrations, CMS paid the programs for providing disease management and care coordination services.[8] In four demonstrations, the programs' fees were at risk—that is, the programs were allowed to retain their fees only to the extent that they were offset by reductions in Medicare expenditures.

Results from independent evaluations showed that most programs had no discernible effect on hospital admissions or regular Medicare expenditures. The estimates for many programs are not very precise, however, because only small or modest numbers of beneficiaries were enrolled.

[8] Disease management and care coordination were among the tools used in the Physician Group Practice Demonstration. That demonstration is not discussed in this paper because Medicare did not pay the participating groups a separate fee for providing disease management or care coordination services. Instead, Medicare offered the groups financial incentives to improve efficiency and quality of care. For a discussion of the results of that demonstration, see Nelson, *Lessons from Medicare's Demonstration Projects on Value-Based Payment.*

Although the analyses for the great majority of programs could not reject the hypothesis that they had no effect on hospital admissions or expenditures, the estimates for some programs have relatively wide confidence intervals, indicating that they could have reduced or increased hospital admissions and expenditures by a sizeable amount. (See Appendix A for a discussion of statistical hypothesis tests and confidence intervals.) Thus, because of small sample sizes, the evaluation might have failed to identify some programs that reduced or increased those outcomes. On the other hand, the findings of the statistical tests conducted separately for the 34 programs have a higher probability of yielding "false positive" results (erroneous conclusions that a program has a statistically significant effect) than is the case for a single test. Thus, some of the programs that were identified as having a statistically significant effect on hospitalizations or expenditures might, in fact, have had no such effect.

Key Features

The demonstrations varied in several dimensions, including the target populations, the nature of the interventions tested, the rules regarding beneficiary participation, and Medicare's approach to paying the programs.[9] The evaluation reports prepared for the demonstrations varied in the amount of detail provided on those issues, and complete information is not available for all features of all programs. In most cases, the programs adapted approaches for the demonstrations that they had previously employed for privately insured people.

Target Populations. The great majority of the programs targeted beneficiaries with one or more chronic conditions, and most also used other criteria to restrict eligibility to beneficiaries who were expected to be high users of health care services. The 15 programs in the Medicare Coordinated Care Demonstration varied widely in the number and types of conditions they targeted.[10] The most commonly targeted conditions in that demonstration were congestive heart failure (CHF), coronary artery disease (CAD), diabetes, and chronic obstructive pulmonary disease (COPD). Ten programs in that demonstration restricted eligibility to beneficiaries who had been hospitalized in the previous year (six programs required that the hospitalization was for the targeted chronic condition). The Medicare Health Support Pilot Program targeted beneficiaries with CHF or diabetes who had a hierarchical condition categories (HCC) risk score of at least 1.35 (which indicates that the projected Medicare spending for a beneficiary is at least 35 percent higher than the average for fee-for-service beneficiaries).[11]

The six programs in the Care Management for High-Cost Beneficiaries Demonstration targeted beneficiaries who had HCC risk scores above a target or high Medicare expenditures before the demonstration, or both. Three programs in that demonstration restricted eligibility to beneficiaries with one or more specific chronic conditions. The programs in the other three demonstrations all targeted beneficiaries with specific chronic conditions.

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[9] Information on the features of the demonstrations was obtained from reports produced for the independent evaluations and from related publications. A complete list of those sources is presented in Appendix B.

[10] One program in the Medicare Coordinated Care Demonstration did not target particular diagnoses but used a statistical model to identify beneficiaries who were likely to require hospitalization during the next 12 months.

[11] CMS uses the HCC system to adjust payments to Medicare Advantage plans to account for differences in enrollees' health status. For the Medicare Health Support Pilot Program, HCC risk scores were computed from diagnoses on Medicare claims for one year before the pilot began.

The demonstrations generally excluded beneficiaries who were receiving hospice services and those who were being treated for complex conditions unrelated to the interventions being tested, such as end-stage renal disease. In some demonstrations, each program was allowed to develop its own exclusion criteria. Some excluded beneficiaries who lived in long-term care facilities or those with cognitive impairments that would have limited their ability to learn self-management. A few programs excluded beneficiaries who were under the age of 65 and entitled to Medicare because of a disability.

The Interventions. Although various interventions were tested, a key component of most demonstrations was the use of nurse care managers to educate patients about their disease, encourage them to follow recommended treatments, and monitor their status. In most programs, the care managers were not integrated into physicians' practices and interacted with patients primarily by telephone. In some programs, the care managers either were employed in physicians' offices or had direct interaction with physicians through other means (for example, by accompanying some patients to their doctors' visits). In those programs, the care managers typically had considerable in-person interaction with patients in addition to their telephone contact.

To varying degrees, some programs tried to improve communication and care coordination—for example, by monitoring patients' medications, sending physicians regular written reports on their patients and contacting them to discuss urgent problems, and teaching patients to communicate more effectively with their physicians. Many programs reportedly tried to provide additional monitoring and education immediately after beneficiaries were discharged from a hospital, but most programs lacked timely information on beneficiaries' hospital stays. Many programs tried to increase physicians' adherence with guideline-based care, and they did so primarily by giving physicians general information about treatment guidelines or encouraging patients to remind their physicians about the tests they should receive. Some programs placed telemonitoring equipment in patients' homes to electronically transmit information on symptoms and clinical indicators such as weight and blood pressure.

The managers of some programs reported that monitoring patients in the demonstrations was more challenging than monitoring privately insured patients because the programs did not have access to timely data on hospital admissions. Those that were sponsored by hospitals or integrated delivery systems were more likely to have such data, but they were a minority of programs in the demonstrations. Moreover, the provider-sponsored programs often lacked complete data on their beneficiaries' admissions to other hospitals. The programs reported that they generally were able to obtain timely data on hospital admissions in their contracts with private health plans because such plans typically require notification or prior authorization when their members are hospitalized. Such requirements are not part of the Medicare fee-for-service program.

Beneficiary Participation. A key difference in the way the demonstrations were designed concerned whether programs were assigned responsibility for a specified population of beneficiaries (a population-based design) or for beneficiaries who volunteered to enroll (an enrollment-based design). In the three demonstrations that used a population-based design, the programs were assigned a group of beneficiaries who met the eligibility criteria, and the programs were responsible for contacting beneficiaries to determine their willingness to participate. The fees were at risk in those demonstrations, and the programs were accountable for

all of the beneficiaries they were assigned, regardless of whether they agreed to participate (see Table 3). During an initial outreach period, which for most programs lasted six months, CMS paid the programs a fee for each beneficiary they were assigned unless and until a beneficiary refused to participate, died, or became ineligible for the demonstration. After the initial outreach period, CMS paid the programs a fee only for beneficiaries who agreed to participate.

In the three demonstrations that used enrollment-based designs, the programs were responsible for identifying beneficiaries who satisfied their eligibility criteria and contacting them to determine whether they were willing to enroll.[12] In two demonstrations, the fees were not at risk. In the third, the programs were accountable only for beneficiaries who enrolled.

A randomized design was used for all programs in the enrollment-based demonstrations and for most programs in the population-based demonstrations. A randomized design was not used for four programs in the Care Management for High-Cost Beneficiaries Demonstration that were sponsored by health care providers because they implemented system-level changes that applied to all of their patients. For those four programs, CMS selected a comparison group of beneficiaries who were patients of other providers, using methods that replicated as closely as possible the methods that were used to identify the beneficiaries that were assigned to the four programs.

Medicare Payments Under the Demonstration. In five of the six demonstrations, CMS paid the programs a monthly fee per beneficiary. The fees were established through negotiation between CMS and the programs and depended in part on the nature and intensity of the intervention. The fees varied greatly across programs. For example, in the Medicare Coordinated Care Demonstration, the monthly fees per beneficiary ranged from $80 to $444, with an average of $235. In the Medicare Health Support Pilot, the monthly fees per beneficiary ranged from $74 to $159. The program in the Demonstration of Informatics for Diabetes Education and Telemedicine did not receive a monthly fee but instead was awarded a cooperative agreement from CMS that provided a fixed budget for the demonstration. The cost of the intervention to CMS in that demonstration was estimated at $720 per enrollee per month.[13]

The fees were not at risk in the Medicare Coordinated Care Demonstration, but they were fully at risk in the other four demonstrations. In the Medicare Health Support Pilot Program and the Demonstration of Disease Management for Dual Eligible Beneficiaries, the programs were allowed to keep their entire fee only if they reduced Medicare expenditures for their beneficiaries by at least the amount of their fee. If they did not reduce Medicare expenditures by that amount,

[12] In the Demonstration of Disease Management for Severely Chronically Ill Beneficiaries, CMS provided the programs with lists of potentially eligible beneficiaries in their service areas, based on an analysis of Medicare claims.

[13] That estimated cost of the intervention does not include the portion of the fixed budget that was allocated for research activities. See Lorenzo Moreno and others, *Final Report to Congress on the Informatics for Diabetes Education and Telemedicine (IDEATel) Demonstration, Phases I and I* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, September 2008), www.mathematica-mpr.com/publications/PDFs/health/IDEATel_rptcongress.pdf.

Table 3.

Key Design Features of the Demonstrations of Disease Management and Care Coordination

Demonstration	Beneficiary Recruitment	Financial Arrangements Between Medicare and the Programs
Demonstration of Care Management for High-Cost Beneficiaries	Population-based design in which CMS identified eligible beneficiaries. For two programs, eligible beneficiaries were randomized into treatment and control groups. Matched comparison groups were selected for the other four programs.	Programs were paid a monthly fee per beneficiary and were at risk for achieving 5 percent savings, net of fees.
Medicare Coordinated Care Demonstration	Enrollment-based design. Programs identified eligible beneficiaries through providers. Beneficiaries who enrolled were randomly assigned to a treatment or control group.	Programs were paid a monthly fee per beneficiary and were not at risk for achieving savings.
Medicare Health Support Pilot	Population-based design in which CMS identified eligible beneficiaries and randomized them into treatment and control groups.	Programs were paid a monthly fee per beneficiary and were at risk for achieving savings and for achieving certain quality of care targets.
Demonstration of Disease Management for Dual Eligible Beneficiaries	Population-based design in which CMS identified eligible beneficiaries and randomized them into treatment and control groups.	Programs were paid a monthly fee per beneficiary and were at risk for achieving savings.
Demonstration of Informatics for Diabetes Education and Telemedicine	Enrollment-based design. The program identified eligible beneficiaries through providers. Beneficiaries were randomized into treatment and control groups.	The program was awarded a cooperative agreement that provided a fixed budget. It was not at risk for achieving savings.
Demonstration of Disease Management for Severely Chronically Ill Beneficiaries	Enrollment-based design in which CMS provided programs with lists of potentially eligible beneficiaries (based on prior claims). Beneficiaries who enrolled were randomized into treatment and control groups.	Programs were paid a monthly fee per beneficiary and were at risk for achieving savings as well as for any increase in Medicare expenditures.

Source: Author's review of information in the sources listed in Appendix B.
Notes: In the population-based demonstrations, programs were responsible for contacting beneficiaries in the treatment group during an initial outreach period that typically lasted six months. Thereafter, programs received a fee only for beneficiaries who agreed to participate. However, programs were at financial risk for all beneficiaries in the treatment group.
CMS = Centers for Medicare & Medicaid Services.

they were allowed to keep only that portion of their fee that was offset by Medicare savings.[14] The Demonstration of Disease Management for Severely Chronically Ill Beneficiaries used the same arrangement except that programs in that demonstration also were at risk for any increase in expenditures on Medicare services. In the Demonstration of Care Management for High-Cost Beneficiaries, the programs were not allowed to keep their entire fee unless they reduced Medicare expenditures for their beneficiaries by at least 5 percent, net of fees. Programs were required to relinquish as much of their fee as necessary (up to the full amount of their fee) to achieve that level of savings. Programs shared with CMS any savings beyond that level.

Effects on Hospital Admissions and Regular Medicare Expenditures

All of the programs sought to reduce hospital admissions by maintaining or improving beneficiaries' health, and that reduction was to be a key mechanism for reducing Medicare expenditures.[15] The evaluations estimated the effects of the demonstrations on hospital admissions and Medicare expenditures separately for each program. This paper synthesizes that information by presenting the average effects of the programs, overall and for programs classified by key characteristics that were expected to be associated with their effectiveness. The paper then discusses specific programs whose effects on hospital admissions and expenditures exceed a specified threshold (defined below).

Most of the evaluations measured the programs' effects over a period of three or four years. However, the Demonstration of Disease Management for Severely Chronically Ill Beneficiaries ended early, and the estimates for that demonstration measure the effects of the three programs over periods ranging from 15 months to 25 months. The estimates for the Demonstration of Informatics for Diabetes Education and Telemedicine measure the program's experience over approximately five years.

Summary of Key Findings. On average, the 34 disease management and care coordination programs had little or no effect on hospital admissions or regular Medicare expenditures

[14] Under the initial terms of the Medicare Health Support Pilot, the programs would have been able to retain their entire fees only if they reduced Medicare expenditures by 5 percent, net of fees. Approximately two years after the start of the pilot, CMS agreed to eliminate that 5 percent net savings requirement in response to requests from the programs. The fees in that pilot also were at risk on the basis of programs' performance regarding quality of care and beneficiary satisfaction. Those arrangements varied among programs, with the at-risk amount ranging from 3 percent to 10 percent of the fee.

[15] Some evaluations also estimated the effects of the programs on the use of other types of services, such as emergency department visits. This paper focuses on the estimated effects on hospitalizations because that measure of use is available for all of the demonstrations and because a reduction in hospital stays is the primary mechanism through which the programs might have reduced Medicare expenditures.

(see Table 4, bottom row).[16] To offset the fees they charged CMS, the programs would have had to reduce regular Medicare expenditures by an average of 11 percent.

Programs whose fees were at risk had greater financial incentives to reduce expenditures. Among the 34 programs, however, those whose fees were at risk had little or no effect on hospital admissions or regular Medicare expenditures and were similar in that respect to programs whose fees were not at risk (see Table 4). That suggests that other features of the programs may have been more important determinants of their effectiveness. To investigate, I used information contained in the evaluation reports to classify programs according to the degree of interaction between care managers and their patients' physicians and the degree of *in-person* interaction between care managers and patients.[17] That analysis showed the following:

- The programs in which care managers had substantial direct interaction with their patients' physicians reduced hospital admissions by an average of 7 percent and reduced regular Medicare expenditures by an average of 6 percent.
- The programs in which care managers had significant in-person interaction with patients, in addition to interaction by telephone, reduced hospital admissions by an average of 7 percent and reduced regular Medicare expenditures by an average of 3 percent.
- Those two groups of programs would have had to reduce regular Medicare expenditures by an average of 13 percent to offset their fees.
- The programs in which care managers did not have substantial direct interaction with their patients' physicians and those in which care managers interacted with patients primarily by telephone had no effect, on average, on hospital admissions or regular Medicare expenditures.

Other program features, such as the criteria for targeting beneficiaries, the training and experience of care managers, the timeliness and comprehensiveness of interventions aimed at patients undergoing care transitions (such as from a hospital to home), and approaches to overseeing and managing patients' medications, also may have influenced their effectiveness at reducing hospital admissions and expenditures. The evaluation reports did not provide sufficiently detailed information for all demonstrations to classify programs on those dimensions, however.

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[16] The precision of the estimates varied greatly among the 34 programs, reflecting substantial differences in sample sizes. The estimates in Table 4 are weighted averages, and the weights are higher for programs with more precise estimates. Specifically, the estimates in Table 4 were produced from a series of random-effects meta-analysis regression models (each with a constant term and a binary variable indicating whether a program had a particular characteristic) in which each program received an "inverse variance" weight equal to the inverse of the sum of the squared standard error of the estimate for that program and the estimated between-program variance. For a description of this approach, see Julian P.T. Higgins, Simon G. Thompson, and David J. Spiegelhalter, "A Re-Evaluation of Random-Effects Meta-Analysis," *Journal of the Royal Statistical Society*, vol. 172, Part 1 (2009), pp. 137–159.

[17] These are among the features that have been identified in past research as influencing the effectiveness of care coordination programs. See Randall Brown, Deborah Peikes, and Greg Peterson, "Features of Successful Care Coordination Programs: Webinar on Care Management of Patients with Complex Health Care Needs" (webinar prepared by Mathematica Policy Research for Robert Wood Johnson Foundation, December 2009), http://www.rwjf.org/files/research/121609.brown.pdf.

Table 4.

Relationship Between Program Design Features and Effects of Disease Management and Care Coordination Programs on Hospital Admissions and Regular Medicare Expenditures

Design Feature	Number of Programs	Average Effects (Percent)		Change in Regular Medicare Expenditures Needed to Offset Programs' Fees[b] (Percent)
		Hospital Admissions	Regular Medicare Expenditures[a]	
Program Fees Put at Risk				
Yes	18	0	-1	-11
No	16	-2	1	-13
Difference		2	-2	2
95 percent CI		(-4, 8)	(-6, 2)	(-4, 8)
P value		0.47	0.38	0.60
Substantial Direct Interaction Between Care Managers and Physicians				
Yes	7	-7	-6	-13
No	27	0	0	-11
Difference		-6	-6	-2
95 percent CI		(-14, 1)	(-11, -1)	(-10, 6)
P value		0.09	0.01	0.63
Interaction Between Care Managers and Patients[c]				
By telephone and in person	8	-7	-3	-13
Primarily by telephone	23	1	0	-11
Difference		-8	-4	-1
95 percent CI		(-14, -2)	(-7, 1)	(-9, 6)
P value		0.01	0.10	0.74
All Programs	**34**	**-1**	**0**	**11**

Source: Author's analysis of information in the sources listed in Appendix B.

Notes: The estimates in the table were derived from a series of random-effects meta-analysis regression models, each containing a constant and a binary variable indicating whether the program had a given feature. Each program received an "inverse variance" weight equal to the sum of the squared standard error of the estimate for that program and the estimated interprogram variance.

For each program in the Care Management for High-Cost Beneficiaries Demonstration, the estimated effect on hospital admissions used in this table is the weighted average of the effect reported in Table 5 for the later of the two time periods analyzed for the original sample and the effect reported for the supplemental sample. The estimated effect on regular Medicare expenditures used for each program equals the weighted average of the estimated effects reported in Table 6 for the original and supplemental samples.

CI = confidence interval.

a. Regular Medicare expenditures exclude fees paid to the programs.
b. The estimates in this column exclude one program that operated under a fixed budget instead of being paid a per-enrollee fee.
c. This classification excludes three programs that relied primarily on the use of home-monitoring devices that electronically transmit information about patients' symptoms and other data about patients' health status to the care managers.

Programs in Which Care Managers Had Substantial Interaction with Physicians. In 7 of the 34 programs, care managers had substantial opportunity for direct interaction with their patients' physicians.[18] In this section, I first discuss the estimated effects of those 7 programs on hospital admissions and then turn to their effects on regular Medicare expenditures.

Effects on Hospital Admissions. According to the evaluation estimates, four of the seven programs in which care managers had substantial interaction with their patients' physicians reduced hospital admissions by at least 10 percent, one increased admissions by at least 10 percent, and two affected admissions by less than 5 percent. In this section, I briefly describe the five programs that had an estimated effect on hospital admissions of at least 10 percent. This discussion is not limited to programs for which the estimated effect was significantly different from zero at conventional levels. I give greater emphasis to the programs with more precise estimates, however, and I report 95 percent confidence intervals for those estimates that are imprecise.[19]

The program sponsored by Massachusetts General Hospital and its affiliated physician group that is participating in the Care Management for High-Cost Beneficiaries Demonstration reduced hospital admissions by 19 percent to 24 percent (see Table 5).[20] (The different estimates were obtained for different periods and beneficiary samples.) Unlike nearly all other programs tested in these six demonstrations, the program at Massachusetts General is closely integrated with the health care delivery system. The program has the strong backing of the hospital's senior management and the physician group, and physicians have been involved in the program's initial design and evolution. The care managers are staff members of primary care physicians' practices, and they have access to patients' electronic medical records. Patients of Massachusetts General Hospital and its affiliated physician group reportedly obtain the vast majority of their health care within that integrated system, so the electronic medical records provide care managers with current information on nearly all of their patients' medical care. Moreover, the hospital notifies care managers when their patients are hospitalized or admitted to the emergency department. The care managers interact with patients by telephone and in person during physician office visits and hospital stays, and they have access to a pharmacist to address potential problems with patients' medications. Eligibility for the Massachusetts General program is limited to beneficiaries who were patients of the integrated delivery system before the

[18] I classified programs in this category if one or more of the following was true: Care managers were employed in physicians' offices, the care managers were located in the same building as physicians (or a nearby building) and had substantial opportunity for direct interaction with physicians, or care managers frequently accompanied patients on their physician visits. Two of the seven programs that satisfied at least one of those criteria are in the Care Management for High-Cost Beneficiaries Demonstration (Massachusetts General and Health Buddy) and five were in the Medicare Coordinated Care Demonstration (Carle, Charlestown, Health Quality Partners, Medical Care Development, and Mercy).

[19] Tables 5 and 6 give sample sizes and point estimates, *P* values, and 95 percent confidence intervals for the effects on hospital admissions and regular Medicare expenditures for each of the 34 programs.

[20] See Nancy McCall, Jerry Cromwell, and Carol Urato, *Evaluation of Medicare Care Management for High-Cost Beneficiaries (CMHCB) Demonstration: Massachusetts General Hospital and Massachusetts General Physicians Organization (MGH), Final Report* (report submitted by RTI International to the Centers for Medicare & Medicaid Services, September 2010), www.massgeneral.org/News/assets/pdf/FullFTIreport.pdf.

Table 5.

Effects of Disease Management and Care Coordination Demonstrations on Hospitalizations

Demonstration and Program	Percentage Effect	95 Percent CI	*P* Value	Treatment Group Size
Care Management for High-Cost Beneficiaries Demonstration				
Massachusetts General				
Original sample				
Months 7–18	-24	(-33, -13)	0.00	2,427
Months 25–36	-19	(-30, -6)	0.01	2,054
Supplemental sample (months 25–36)	-24	(-42, -1)	0.04	716
Health Buddy Consortium				
Original sample				
Months 7–18	0	(-22, 29)	0.99	710
Months 27–38	-12	(-36, 20)	0.41	542
Supplemental sample (months 27–38)	-26	(-42, -5)	0.02	903
Care Level Management				
Original sample				
Months 6-17	-3	(-9, 4)	0.43	11,150
Months 18–29	-6	(-13, 1)	0.11	9,209
Supplemental sample (months 18–29)	-6	(-12, 0)	0.05	12,308
Village Health				
Original sample				
Months 7–18	-10	(-20, 1)	0.07	4,432
Months 25–36	-6	(-18, 7)	0.33	3,571
Supplemental sample (months 25–36)	-4	(-20, 15)	0.66	2,069
Montefiore Medical Center				
Original sample				
Months 7–18	7	(-8, 25)	0.36	2,663
Months 25–36	0	(-16, 19)	0.97	2,159
Supplemental sample (months 25–36)	2	(-20, 30)	0.88	805
Texas Tech University				
Original sample				
Months 5–16	17	(6, 28)	0.01	4,903
Supplemental sample	n.a.	n.a.	n.a.	
Coordinated Care Demonstration				
Georgetown University	-24	(-49, 1)	0.07	115
Mercy Medical Center	-17	(-31, -3)	0.02	467
Health Quality Partners	-11	(-28, 6)	0.19	740
Hospice of the Valley	-7	(-21, 7)	0.31	531
University of Maryland	-7	(-45, 30)	0.70	92
CorSolutions	-3	(-11, 5)	0.42	1,511
Medical Care Development	-3	(-16, 9)	0.60	669

Table 5. **Continued**

Effects of Disease Management and Care Coordination Demonstrations on Hospitalizations

Demonstration and Program	Percentage Effect	95 Percent CI	*P* Value	Treatment Group Size
Avera	-2	(-17, 13)	0.82	430
Washington University	-2	(-11, 8)	0.78	1,150
Q Med	1	(-14, 17)	0.86	707
Carle	4	(-7, 15)	0.45	1,338
Quality Oncology	4	(-40, 49)	0.85	107
CenVaNet	6	(-8, 20)	0.41	722
Jewish Home and Hospital	11	(-7, 30)	0.24	435
Charlestown	19	(1, 37)	0.04	413
Health Support Pilot				
Aetna	-6	(-11, -1)	0.04	20,259
Healthways	-3	(-8, 2)	0.24	20,031
Health Dialog	0	(-5, 5)	0.98	20,039
Green Ribbon	2	(-3, 7)	0.58	22,605
LifeMasters	2	(-3, 7)	0.36	20,120
McKesson	2	(-3, 7)	0.35	20,174
XLHealth	2	(-3, 7)	0.47	19,518
CIGNA	4	(-1, 9)	0.20	20,361
Demonstration of Disease Management for Dual Eligible Beneficiaries				
LifeMasters	-1	(-6, 3)	0.56	36,959
Demonstration of Informatics for Diabetes Education and Telemedicine				
Columbia University Consortium				
New York City				
Original sample	-10	(-20, 1)	0.07	379
Supplemental sample	-9	(-24, 7)	0.29	82
Upstate New York				
Original sample	2	(-8, 11)	0.73	446
Supplemental sample	-26	(-52, 0)	0.05	161
Demonstration of Disease Management for Severely Chronically Ill Beneficiaries				
CorSolutions	-6	(-23, 11)	0.51	1,097
XLHealth	1	(-3, 6)	0.57	11,178
HeartPartners	4	(-5, 13)	0.35	5,890

Source: Author's analysis of information in the sources listed in Appendix B.
Notes: For definitions of 95 percent confidence intervals (CI) and *P* values, see Appendix A. The estimates for the Demonstration of Informatics for Diabetes Education and Telemedicine measure the effect of the demonstration on the percentage of beneficiaries who were admitted rather than the number of hospitalizations.
n.a. = not applicable.

demonstration and whose HCC risk scores and past Medicare expenditures exceeded specified amounts.[21] The program does not target beneficiaries with particular chronic conditions.

The evaluation of the Health Buddy program in the Care Management for High-Cost Beneficiaries Demonstration produced substantially different estimates for different samples and different time periods.[22] The Health Buddy program placed a small appliance in beneficiaries' homes to provide education and coaching and enable beneficiaries to transmit information on their symptoms and physiological measurements electronically to care managers. The program is operating at two multispecialty group practices in the Northwest, each of which developed a partnership with the medical technology company that developed the Health Buddy appliance. For the sample assigned to the program at the beginning of the demonstration, the program had no effect on hospital admissions in months 7–18 of the demonstration, but the estimate for months 27–38 implied a reduction of 12 percent. (The latter estimate was imprecise, however, with a 95 percent confidence interval ranging from a 36 percent reduction to a 20 percent increase.) For a supplemental sample that was assigned to the program at the beginning of the second year, the program reduced hospital admissions by 26 percent. The program modified the eligibility criteria for the supplemental sample from that specified for the original sample to target beneficiaries that it deemed would benefit most from the intervention. Based on early experiences with the demonstration, the program also enhanced the Health Buddy appliance to meet the needs of beneficiaries with more than one chronic condition. Because the program made adjustments in the second year on the basis of experiences in the first year, the results for its supplemental sample could be more indicative of the long-run impacts of the program.

The program sponsored by Mercy Medical Center in the Medicare Coordinated Care Demonstration reduced hospital admissions by 17 percent.[23] Mercy Medical Center is a rural health care system based in Mason City, Iowa, that includes several hospitals and a network of clinics. Some of the care managers are located in physicians' offices and others are located in the program's main office or satellite offices. The care managers accompanied some of their patients on their physicians' visits, and they had significant in-person interaction with their patients in addition to interaction by telephone. The program targeted beneficiaries who had been hospitalized or treated at an emergency department at one of its facilities during a one-year period before the demonstration for one or more of the following conditions: CHF, COPD, liver disease, stroke, vascular disease, and renal failure.

Health Quality Partners (in the Medicare Coordinated Care Demonstration) reduced hospital admissions by an estimated 11 percent, with a 95 percent confidence interval ranging from a 28

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[21] Specifically, beneficiaries are eligible if they have an HCC risk score of at least 2.0 and Medicare expenditures of at least $2,000 per month during a specified baseline period before the demonstration or if they have an HCC risk score of at least 3.0 and baseline Medicare expenditures of at least $1,000 per month.

[22] See Nancy McCall and others, *Evaluation of Medicare Care Management for High-Cost Beneficiaries (CMHCB) Demonstration: The Health Buddy Consortium (HBC), Revised Final Report* (report submitted by RTI International to the Centers for Medicare & Medicaid Services, April 2011), www.cms.gov/reports/downloads/McCall_Eval_of_CMHCB_Demo_April_2011.pdf.

[23] See Deborah Peikes and others, "Effects of Care Coordination on Hospitalization, Quality of Care, and Health Care Expenditures Among Medicare Beneficiaries: 15 Randomized Trials," *Journal of the American Medical Association*, vol. 301, no. 6 (February 11, 2009), pp. 603–618.

percent reduction to a 6 percent increase. Health Quality Partners provides wellness and care management services in eastern Pennsylvania. As with Mercy Medical Center, the program's care managers have a significant amount of in-person interaction with their patients in addition to interaction by telephone, and they frequently meet their patients at physicians' offices at the time of their appointments. The program targeted beneficiaries who had one or more of the following conditions: asthma, CHF, CAD, diabetes, hypertension, and hyperlipidemia. The program did not impose any other criteria (such as a prior hospital stay) to target beneficiaries who were likely to be heavy users of health care services. For certain "high-risk" enrollees, Health Quality Partners reduced hospital admissions by 24 percent.[24] The analysis defined high-risk enrollees as beneficiaries who, at the time of enrollment, had either: CHF, CAD, or COPD and at least one hospitalization in the prior year, or at least 2 hospitalizations in the prior two years and one or more of 12 specified chronic conditions. Such beneficiaries constituted only 15 percent of the program's total enrollment. This finding suggests that targeting such interventions to beneficiaries who are at high risk of hospitalization could significantly increase their effectiveness.

The program sponsored by Charlestown Retirement Community in the Medicare Coordinated Care Demonstration increased hospital admissions by 19 percent. Charlestown is a retirement community in Maryland that offers independent living, assisted living, and nursing home care to senior citizens; it also has an on-site clinic. The care managers had offices in the same building as the physicians, or were close by, and frequently interacted with the physicians. Eligibility for the demonstration was limited to beneficiaries residing in the community's independent-living settings who had CHF, CAD, diabetes, or COPD. The program's enrollees were much older than those in other programs; nearly 45 percent were at least 85 years old. It is not known how that age profile of the program's enrollees influenced the program's effect on hospital admissions.

Effects on Regular Medicare Expenditures. The estimated effects on regular Medicare expenditures among the seven programs in which care managers had substantial interaction with their patients' physicians are generally consistent with their effects on hospital admissions. In this section, I focus on the five programs described above that reduced or increased hospital admissions by at least 10 percent.[25] Massachusetts General had the greatest estimated reduction in regular Medicare expenditures (12 percent to 16 percent), which was more than the 5 percent savings that it needed to achieve to offset its fee (see Table 6 and Figure 1).

For the Health Buddy program, the point estimates from the CMS-funded evaluation imply that the program reduced regular expenditures by 6 percent to 8 percent, but those estimates were imprecise.[26] A recent study by Laurence Baker and others found that the Health Buddy program

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[24] See Brown, Peikes, and Peterson, "Features of Successful Care Coordination Programs."

[25] The two programs that affected hospital admissions by less than 10 percent (Carle and Medical Care Development) also affected regular Medicare expenditures by less than 10 percent.

[26] Nancy McCall and others, *Evaluation of Medicare Care Management for High-Cost Beneficiaries (CMHCB) Demonstration: The Health Buddy Consortium (HBC), Revised Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, April 2011), www.cms.gov/reports/downloads/McCall_Eval_of_CMHCB_Demo_April_2011.pdf. The 95 percent confidence intervals for the two estimates range from a reduction of 20 percent to an increase of 4 percent and from a reduction 20 percent to an increase of 8 percent, respectively.

reduced regular expenditures by 8 percent to 13 percent.[27] The two studies used somewhat different methods. A key difference is that the study by Baker and others obtained larger sample sizes (and thus greater statistical power) by pooling the original and supplemental samples for the analysis, whereas the CMS-funded evaluation conducted the analysis separately for the two samples. A third set of estimates comes from the financial reconciliations conducted by an actuarial research company under contract to Medicare to determine how much, if any, of the fees the programs were entitled to retain. The financial reconciliations, which used somewhat different methods than the evaluation and the study by Baker and others, showed that the Health Buddy program reduced regular expenditures by enough to cover its fee (which required a reduction in regular expenditures of 5 percent) and generate the 5 percent net savings required under the demonstration.[28]

The results for Mercy Medical Center and Health Quality Partners were consistent with a reduction in regular expenditures of about 10 percent, although in each case the estimates were somewhat imprecise.[29] For Health Quality Partners, the estimated savings was approximately the amount that was needed to offset its fee, but for Mercy Medical Center, the estimated savings was only about half the amount that would have been needed to offset its fee. Based on those findings, CMS offered to extend the demonstration for the two programs for up to three years, but Mercy Medical Center would have been required to reduce its fee by about half.[30] Health Quality Partners accepted (with no change in its fee), but Mercy declined.

The Charlestown program increased regular Medicare expenditures by 19 percent. After accounting for its fee, which was not at risk, Charlestown increased net federal spending on its enrollees by about 40 percent.

Programs in Which Care Managers Had Significant In-Person Interaction with Patients. In eight programs, care managers had significant in-person interaction with patients, in addition to interaction by telephone.[31] In four of those programs (Massachusetts General, Mercy, Health Quality Partners, and Charlestown), care managers also had substantial direct interaction with patients' physicians.[32]

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[27] Laurence C. Baker and others, "Integrated Telehealth and Care Management Program for Medicare Beneficiaries with Chronic Disease Linked to Savings," *Health Affairs*, vol. 30, no. 9 (September 2011), pp. 1689–1697.

[28] For a discussion of how the methods used in the evaluation differed from those used in the financial reconciliations, see McCall and others, *Evaluation of Care Management for High-Cost Beneficiaries Demonstration: The Health Buddy Consortium (Revised Final Report)*.

[29] The 95 percent confidence interval for Mercy ranged from a 21 percent reduction in regular Medicare expenditures to a 3 percent increase, and the corresponding confidence interval for Health Quality Partners ranged from a 27 percent reduction to a 3 percent increase.

[30] Those two programs are among 11 that CMS had previously extended for two years.

[31] I classified programs based on the description of the interventions in the evaluation reports. For evaluations that reported the average number of in-person contacts, I classified programs as having a significant amount of in-person contact if they had an average of at least six in-person contacts per patient per year.

[32] The other four programs in which care managers had significant in-person interaction with patients are three from the Coordinated Care Demonstration (Jewish Home and Hospital, Hospice of the Valley, and Georgetown University) and one from the Care Management for High-Cost Beneficiaries Demonstration (Care Level Management).

Table 6.

Effects of Disease Management and Care Coordination Demonstrations on Regular Medicare Expenditures

Demonstration and Program	Percentage Effect	95 Percent CI	*P* Value	Program Fee as a Percentage of Control Group Expenditures
Care Management for High-Cost Beneficiaries Demonstration				
Massachusetts General				
Original population	-12	(-19, -5)	0.00	5
Supplemental population	-16	(-30, -2)	0.02	5
Health Buddy Consortium				
Original population	-8	(-20, 4)	0.19	4
Supplemental population	-6	(-20, 8)	0.41	5
Village Health				
Original population	-4	(-11, 2)	0.18	4
Supplemental population	-6	(-15, 3)	0.22	3
Montefiore Medical Center				
Original population	-1	(-9, 8)	0.89	4
Supplemental population	-6	(-20, 9)	0.47	4
Care Level Management				
Original population	2	(-4, 7)	0.55	12
Supplemental population	-1	(-6, 4)	0.69	12
Texas Tech University				
Original population	9	(2, 16)	0.01	9
Supplemental population	n.a.	n.a.	n.a.	n.a.
Coordinated Care Demonstration				
Georgetown University	-14	(-41, 12)	0.31	9
Health Quality Partners	-12	(-27, 3)	0.12	15
Mercy Medical Center	-9	(-21, 3)	0.12	20
Medical Care Development	-6	(-19, 7)	0.36	8
Avera	-3	(-18, 12)	0.72	19
Q Med	-2	(-17, 13)	0.77	11
Quality Oncology	-1	(-26, 24)	0.93	2
CorSolutions	1	(-8, 9)	0.90	8
Hospice of the Valley	1	(-10, 12)	0.87	9
CenVaNet	5	(-8, 17)	0.47	8
Washington University	5	(-5, 14)	0.34	8
Carle	9	(-1, 19)	0.08	21
Jewish Home and Hospital	10	(-7, 27)	0.25	13
Charlestown	19	(2, 35)	0.03	22
University of Maryland	35	(-39, 109)	0.35	10

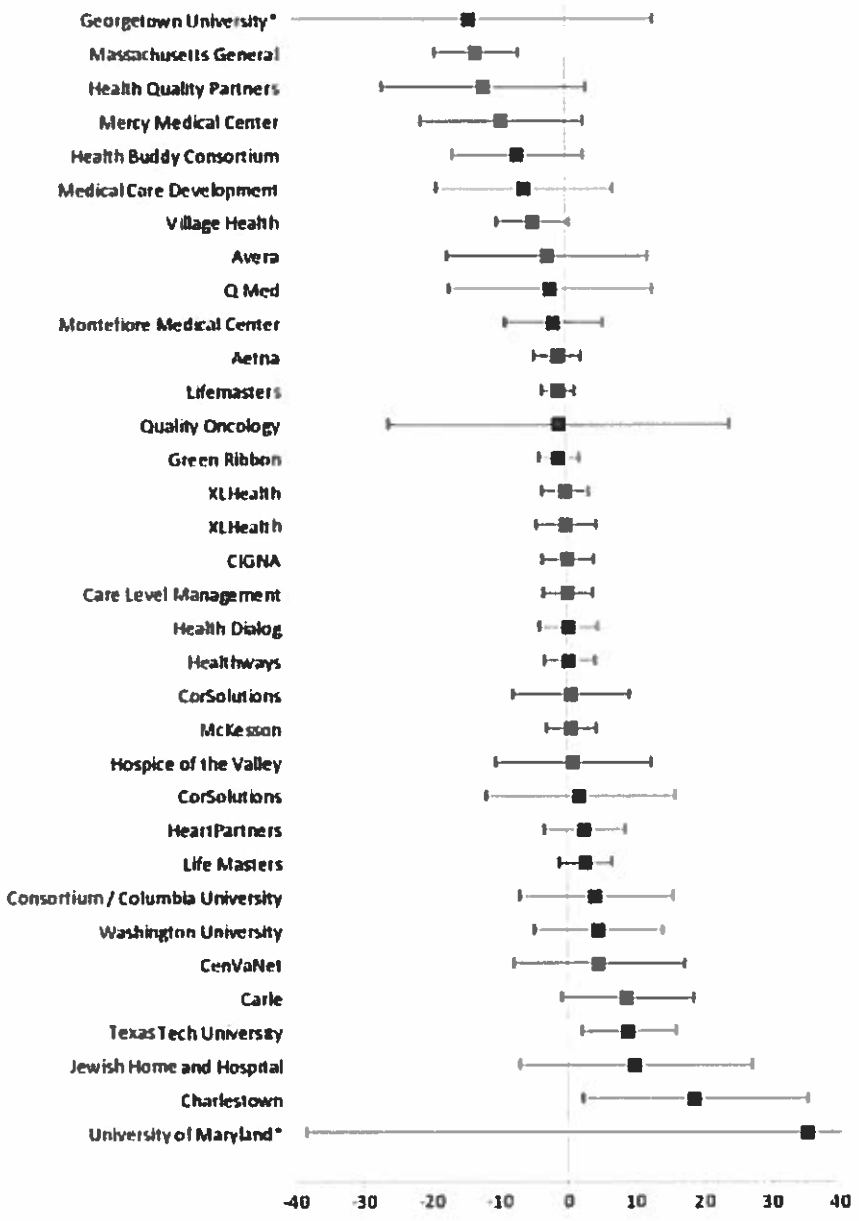
Table 6. **Continued**

Effects of Disease Management and Care Coordination Demonstrations on Regular Medicare Expenditures

Demonstration and Program	Percentage Effect	95 Percent CI	*P* Value	Program Fee as a Percentage of Control Group Expenditures
Health Support Pilot				
Aetna	-1	(-5, 2)	0.48	8
Green Ribbon	-1	(-4, 2)	0.48	5
CIGNA	0	(-4, 4)	0.90	9
Health Dialog	0	(-4, 5)	0.89	8
Healthways	0	(-3, 4)	0.83	6
XLHealth	0	(-4, 3)	0.94	11
McKesson	1	(-3, 4)	0.73	8
Life Masters	3	(-1, 7)	0.25	7
Demonstration of Disease Management for Dual Eligible Beneficiaries				
LifeMasters				
Total population	-1	(-4, 1)	0.33	7
Redesigned population	-4	(-8, -1)	0.01	5
Demonstration of Informatics for Diabetes Education and Telemedicine				
Columbia University Consortium				
New York City				
Original population	7	(-12, 26)	0.48	67
Supplemental population	2	(-44, 48)	0.93	72
Upstate New York				
Original population	13	(-2, 29)	0.09	103
Supplemental population	-26	(-59, 8)	0.13	97
Demonstration of Disease Management for Severely Chronically Ill Beneficiaries				
XLHealth	0	(-4, 4)	0.98	29
CorSolutions	2	(-12, 16)	0.79	26
HeartPartners	3	(-4, 9)	0.41	36

Source: Author's analysis of information in the sources listed in Appendix B.
Notes: Regular Medicare expenditures exclude fees paid to the programs. For definitions of 95 percent confidence intervals (CI) and *P* values, see Appendix A.
n.a. = not applicable.

Figure 1.
Percentage Effect of Disease Management and Care Coordination Demonstrations on Regular Medicare Expenditures



Source: Author's analysis of information in the sources listed in Appendix B.
Note: The line for each program represents the 95 percent confidence interval of the estimate of the effect on regular Medicare expenditures (which exclude fees paid to the programs); each box is a point estimate. An asterisk indicates that the upper or lower limit of the 95 percent confidence interval is greater than or less than 40 percent. For Georgetown University, the lower limit of the confidence interval is -41 percent; for the University of Maryland the upper limit is 109 percent. For the six programs in the Care Management for High-Cost Beneficiaries Demonstration, the point estimates are the weighted averages of the estimates reported for the original and supplemental samples. For the program sponsored by Columbia University in the Demonstration of Informatics for Diabetes Education and Telemedicine, the point estimate is the weighted average of the estimates reported for New York City and Upstate New York for the original and supplemental samples.

Four of the eight programs that had significant in-person interaction with patients reduced hospital admissions by at least 10 percent, two increased admissions by at least 10 percent, and two affected admissions by less than 10 percent. Three of the four programs that reduced admissions by at least 10 percent were discussed above (Massachusetts General, Mercy, and Health Quality Partners). The fourth program was sponsored by Georgetown University in the Medicare Coordinated Care Demonstration. The point estimates for that program imply that it reduced hospital admissions by 24 percent and reduced regular Medicare expenditures by 14 percent. Those estimates are imprecise, however (for example, the 95 percent confidence interval for the program's estimated effect on hospital admissions ranges from a 49 percent reduction to a 1 percent increase). The program enrolled only 115 beneficiaries over four years and withdrew early from the demonstration.

The program sponsored by Hospice of the Valley in the Coordinated Care Demonstration reduced hospital admissions for its general enrollee population by 7 percent (with a 95 percent confidence interval, ranging from a 21 percent reduction to a 7 percent increase). For high-risk enrollees (defined in the same manner as described above for Health Quality Partners), Hospice of the Valley reduced hospital admissions by 13 percent.[33] High-risk enrollees made up two-thirds of the program's enrollment.

The two programs that increased hospital admissions by at least 10 percent are Charlestown and Jewish Home and Hospital (both from the Coordinated Care Demonstration). Jewish Home and Hospital increased hospital admissions by 11 percent, an estimate with a 95 percent confidence interval ranging from a 7 percent reduction to a 30 percent increase. That program was estimated to have increased regular Medicare expenditures by 10 percent (with a 95 percent confidence interval, ranging from a 7 percent reduction to a 27 percent increase). Like Charlestown, Jewish Home and Hospital had a high share of its enrollees who were at least 85 years old (38 percent). The program's fees were not at risk, and the point estimate of the program's effect on regular Medicare expenditures implies that it increased net federal spending on its enrollees by more than 20 percent.

Other Programs. In 21 programs, the care managers did not have significant direct interaction with patients' physicians, and they interacted with patients primarily by telephone.[34] All but one of those 21 programs had no more than a 6 percent effect on hospital admissions or regular Medicare expenditures in either direction. The only program with a larger effect was sponsored by the Texas Tech Health Sciences Center and its affiliated physicians in the Care Management for High-Cost Beneficiaries Demonstration. That program increased hospitalizations by 17

[33] See Brown, Peikes, and Peterson, "Features of Successful Care Coordination Programs." The patients served by Hospice of the Valley for the demonstration were not the same patients for which it was providing hospice services.

[34] This does not include two programs in which the intervention focused primarily on the use of electronic monitoring devices (the University of Maryland in the Coordinated Care Demonstration and the consortium led by Columbia University in the Demonstration of Informatics for Diabetes Education and Telemedicine). I did not classify those two programs on whether care managers interacted with patients primarily by telephone because of the unique features of their monitoring interventions. Both programs had small samples and imprecise estimates.

percent and increased regular Medicare expenditures by 9 percent.[35] The fees were at risk for Texas Tech, and the program voluntarily withdrew from the demonstration after 16 months to limit its financial liability. The Texas Tech Health Sciences Center and its affiliated physicians formed a partnership with a disease management company for the demonstration. The care managers were not integrated into physicians' practices but operated primarily from remote call centers. The program's service area was mostly rural, and 40 of the 48 counties are officially designated as primary care shortage areas by the federal government. The program targeted beneficiaries who were patients of the health system before the demonstration who had high Medicare expenditures in the previous year or a high HCC risk score. It did not target beneficiaries who had specific chronic conditions.

Effects on Total Medicare Expenditures, Including Program Fees

To reduce total Medicare expenditures, a disease management or care coordination program must reduce regular expenditures by more than enough to offset its fee. A program's effect on total expenditures also depends on the amount of financial risk, if any, it accepted. Both demonstrations that did not place the programs' fees at risk increased total Medicare expenditures; neither generated enough savings to offset the fees. In the demonstrations in which the fees were at risk, the financial reconciliations that determined whether the programs were required to return any fees were based on analyses conducted by an actuarial firm under contract to CMS rather than on the results of the evaluations. In most cases, CMS has not released the results of those financial reconciliations.[36] However, the evaluations also estimated the effects of the programs on total expenditures.

In the demonstrations in which fees were at risk, the evaluation estimates imply that one program (Massachusetts General) reduced total expenditures by about 7 percent to 11 percent, one program (Texas Tech) increased total expenditures by about 9 percent, and the other programs had little or no effect on total expenditures. As noted above, the financial reconciliation for the Health Buddy program showed that it reduced regular expenditures by enough to generate the 5 percent net savings required under the demonstration and cover its entire fee. On the basis of the results of the financial reconciliations, CMS extended the Care Management for High-Cost Beneficiaries Demonstration for an additional three years for the Massachusetts General and Health Buddy programs.

Effects on Quality of Care and Beneficiary Behavior

The 34 programs had little or no systematic effects on the process of care measures that were examined. The measures varied across demonstrations but typically included the percentage of beneficiaries who received certain general preventive services (such as influenza vaccinations) and services recommended for people with certain conditions (such as annual eye examinations

[35] See Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Texas Senior Trails (TST), Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, February 2010), www.cms.gov/reports/downloads/CMHCB_TST_McCall_2010.pdf.

[36] The programs in one demonstration have initiated legal action arguing that they should not be required to return any fees because of problems with the way the demonstration was implemented. The effect of that demonstration on total expenditures depends on the outcome of the legal action.

for people with diabetes). Although the programs increased the percentage of beneficiaries who reported being taught self-management skills, they had little or no effect on the percentage who reported adherence to those regimens.

Strengths and Weaknesses of the Demonstration Designs

The demonstrations tested various approaches to specifying the financial risk, if any, that disease management or care coordination programs are required to assume. Not putting the fees at risk encourages participation but creates a weaker incentive for the programs to reduce costs, and it exposes the Medicare program to the greatest risk of incurring an increase in total expenditures. On the other hand, putting programs at risk both for fees and for any increase in regular Medicare expenditures discourages participation but it gives programs a strong incentive to reduce costs. Among the demonstrations that put only the fees at risk, one required that programs achieve 5 net savings for Medicare to receive the entire fee, and two others required only that the programs' fees be offset by a reduction in regular expenditures. Comparing those two approaches, requiring a net savings of 5 percent is less likely to encourage participation but creates a stronger incentive for programs to reduce costs and is more likely to generate savings for Medicare.

An important strength of the demonstrations of disease management and care coordination is that a randomized design was used for 30 of the 34 programs. A major advantage of a randomized design is that the beneficiaries who received the intervention are expected to be similar to beneficiaries in the control group with respect to characteristics that affect outcomes of interest, such as health status, attitudes, and Medicare expenditures and use of services before the demonstration. Consequently, differences in outcomes between the treatment group and the control group can be attributed to the effects of the intervention.

Matched comparison groups were selected for the four programs in the Care Management for High-Cost Beneficiaries Demonstration that did not use a randomized design. The comparison groups were required to meet the same eligibility criteria as the treatment groups, and they were selected to match the respective treatment groups on their distribution of past Medicare expenditures, HCC risk scores, or both. However, the comparison groups were patients of providers other than those that sponsored the demonstration programs, and the two groups of providers may have differed in ways that affected expenditures and other outcomes during the demonstration. Although considerable care was taken in identifying comparison groups that were similar to the treatment groups, such designs carry the risk that the effects of the program may be confounded with differences in outcomes that are the result of underlying differences between the two groups.

The evaluations used an intention-to-treat design—that is, all beneficiaries who were initially assigned to the treatment and control (or comparison) groups were included in the analysis, regardless of whether they participated in the intervention. Such a design is appropriate for measuring the overall effects of an intervention. If participants alone had been included, the analyses would have yielded estimates of the effects of the demonstration on those particular beneficiaries, which may not provide a reliable guide to the overall effects of implementing a particular program. The evaluations had a wide range of data for estimating the effects of the demonstrations. Medicare claims were used to estimate effects on Medicare expenditures and certain measures of quality of care (such as whether beneficiaries received tests that are covered

by Medicare). Moreover, the evaluations had information on the fees that CMS paid for each program and could thus estimate effects on total Medicare expenditures, after accounting for the fees. The evaluations also conducted surveys of beneficiaries that were used to estimate the effects of the demonstrations on self-reported health, satisfaction with care, and health behaviors. In addition, information on the nature of the interventions was obtained from on-site and telephone interviews with program staff.

Discussion

The findings from the demonstrations illustrate that developing and implementing policies involving disease management or care coordination that reduce Medicare expenditures while improving or maintaining the quality of care can be very challenging. The demonstrations tested approaches that appeared promising, and in most cases the participants were experienced organizations that were selected in part based on their likelihood of success, but few interventions resulted in net savings for Medicare.

Overall, the demonstration results indicate that additional experimentation, evaluation, and refinement over a period of years will probably be needed to identify policies involving disease management and care coordination that can significantly reduce Medicare expenditures. The lack of success of most programs tested in the demonstrations reflects the substantial challenges of overcoming the important limitations of Medicare's fee-for-service payment system, which rewards providers for delivering more care but does not pay them for coordinating with other providers, and the decentralized health care delivery system, which does not facilitate communication and coordination among providers. Moreover, programs that attempt to improve the care of beneficiaries with chronic conditions face a major challenge in motivating people to change their health habits regarding diet, exercise, and other self-care behavior. This may be especially true when the programs are of limited duration, and providers may be similarly hesitant to invest in major changes for a short-term demonstration. The findings from the demonstrations suggest that more substantial changes to payment and delivery systems will probably be necessary to significantly reduce spending while increasing or maintaining quality of care.

Appendix A.

Hypothesis Tests and Confidence Intervals

One objective of many statistical analyses is to draw inferences about the average for a population on the basis of data collected from a sample of that population. In the context of the demonstrations, the population parameters of interest are the average effects of the interventions on outcomes such as Medicare expenditures and quality of care, and the samples are the groups of beneficiaries who participated in the demonstrations.

The effects of a demonstration would be expected to vary from sample to sample (even if the eligibility criteria and all other features of the demonstration were held constant) because of random variation across beneficiaries in characteristics that influence the outcomes. For example, the effects of a particular disease management program would be expected to vary among samples because of random variation in characteristics such as beneficiaries' health status, their ability and motivation to follow self-care regimens, and their physicians' practice styles. Consequently, the effects of an intervention estimated in any given demonstration may differ to an unknown extent from the effects that would be observed if the intervention was applied to the entire eligible population. However, based on the information about the dispersion of outcomes within a sample, it is possible to draw inferences about the likely effects of the interventions on the underlying population. This paper reports the results of two approaches to drawing such inferences about the effects of the demonstrations: conducting hypothesis tests about the effects and constructing confidence intervals for the effects.

Hypothesis Tests

Hypothesis testing involves calculating the probability that a "null hypothesis" is true—such as whether an intervention had no effect. To test a hypothesis, data for a sample are used to construct a test statistic based on the average effect of the intervention and the dispersion of the outcomes. Assuming there actually was no effect of the intervention, it is possible to calculate the probability of obtaining a test statistic just by chance that is at least as large (in absolute value) as the value observed for the sample. That probability is called the "*P* value." The smaller the *P* value, the less likely it is that the null hypothesis is true. Effects of interventions are often referred to as being statistically significant, or rejecting the null hypothesis, if the *P* value is less than a threshold, such as 5 percent. Conceptually, the null hypothesis is rejected if the value of the test statistic is so different from the value that would be observed if the null hypothesis was true that such a difference is unlikely to be the result of chance.

Confidence Intervals

Confidence intervals provide a range of values that is likely to include the average for the population overall. The width of a confidence interval gives information about the uncertainty of the estimate. Confidence intervals are estimated from sample data and generally vary across samples drawn from a given population. To construct a confidence interval, analysts must specify the confidence level (typically 95 percent), which is the probability that a confidence interval will contain the population average. When a 95 percent confidence interval is constructed, it means that such intervals from 95 percent of independent random samples drawn from the same population would be expected to include the population average.

Appendix B
Studies of the Medicare Demonstrations Reviewed for This Paper

Medicare Coordinated Care Demonstration

Deborah Peikes and others, "Effects of Care Coordination on Hospitalization, Quality of Care, and Health Care Expenditures Among Medicare Beneficiaries, *Journal of the American Medical Association*, vol. 301, no. 6 (February 11, 2009), pp. 603–618.

Deborah Peikes and others, *Third Report to Congress on the Evaluation of the Medicare Coordinated Care Demonstration* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, January 2008, www.policyarchive.org/handle/10207/bitstreams/15737.pdf.

Randall Brown and others, *The Evaluation of the Medicare Coordinated Care Demonstration: Findings for the First Two Years* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, March 2007), www.mathematica-mpr.com/publications/pdfs/mccdfirsttwoyrs.pdf .

Randall Brown and others, "15-Site Randomized Trial of Coordinated Care in Medicare FFS," *Health Care Financing Review*, vol. 30, no. 1 (Fall 2008), pp. 5–25.

Medicare Health Support Pilot Program

Nancy McCall and Jerry Cromwell, "Results of the Medicare Health Support Disease-Management Pilot Program," *The New England Journal of Medicine*, vol. 365, no. 18 (November 3, 2011), pp. 1704–1712.

Nancy McCall and others, *Evaluation of Phase I of the Medicare Health Support Pilot Program Under Traditional Fee-for-Service Medicare: 18-Month Interim Analysis, Report to Congress* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, October, 2008), www.cms.gov/reports/downloads/MHS_Second_Report_to_Congress_October_2008.pdf.

Nancy McCall, Jerry Cromwell, and Shulamit Bernard, *Evaluation of Phase I of Medicare Health Support (Formerly Voluntary Chronic Care Improvement) Pilot Program Under Traditional Fee-for-Service Medicare, Report to Congress* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, June 2007), www.cms.gov/reports/downloads/McCall.pdf.

Jerry Cromwell, Nancy McCall, and Joe Burton, "Evaluation of Medicare Health Support Chronic Disease Pilot Program," *Health Care Financing Review*, vol. 30, no. 1 (Fall 2008), pp. 47–60.

Demonstration of Care Management for High-Cost Beneficiaries

Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Montefiore Medical Center's Care Guidance Program (CGP), Revised Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, May 2011), www.cms.gov/reports/downloads/McCall_MontefioreFinalReport_May_2011.pdf.

Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Massachusetts General Hospital and Massachusetts General Physicians Organization and Massachusetts General Physicians Organization (MGH), Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, September 2010), www.cms.gov/reports/downloads/McCall_MGH_CMHCB_Final_2010.pdf.

Nancy McCall, Jerry Cromwell, and Carol Urato, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: VillageHealth's Key to Better Health (KTBH), Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, September 2010), www.cms.gov/reports/downloads/McCall_KTBH_Final_2010.pdf.

Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Texas Senior Trails (TST), Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, February 2010), www.cms.gov/reports/downloads/CMHCB_TST_McCall_2010.pdf .

Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Care Level Management (CLM), Final Report* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, January 2010), www.cms.gov/reports/downloads/CMHCB_CLM_McCall_2010.pdf.

Nancy McCall and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: The Health Buddy Consortium (HBC), Revised Final Report*, (report prepared by RTI International for the Centers for Medicare & Medicaid Services, April 2011), www.cms.gov/reports/downloads/McCall_Eval_of_CMHCB_Demo_April_2011.pdf.

Kevin Smith and others, *Evaluation of Medicare Care Management for High Cost Beneficiaries (CMHCB) Demonstration: Results of the Medicare Health Services Survey* (report prepared by RTI International for the Centers for Medicare & Medicaid Services, November 2008).

Demonstration of Disease Management for Dual Eligible Beneficiaries

Dominick Esposito, Kate A. Stewart, and Randall Brown, *Evaluation of Medicare Disease Management Programs: LifeMasters Final Report of Findings* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, October 2008), www.cms.gov/reports/downloads/Esposito_10_2008_Report.pdf.

Dominick Esposito and others, "Impacts of a Disease Management Program for Dually Eligible Beneficiaries," *Health Care Financing Review*, vol. 30, no. 1 (Fall 2008), pp. 27–45.

Demonstration of Informatics for Diabetes Education and Telemedicine

Lorenzo Moreno and others, *Final Report to Congress on the Informatics for Diabetes Education and Telemedicine (IDEATel) Demonstration, Phases I and II, Final Report* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, September 2008), www.mathematica-mpr.com/publications/PDFs/health/IDEATel_rptcongress.pdf.

Lorenzo Moreno and others, *Second Interim Report on the Informatics for Diabetes Education and Telemedicine (IDEATel) Demonstration: Final Report on Phase I* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, June 2005) www.mathematica-mpr.com/publications/PDFs/diabeteseducation.pdf.

Demonstration of Disease Management for Severely Chronically Ill Beneficiaries

Arnold Chen and others, *Report to Congress on the Evaluation of Medicare Disease Management Programs* (report submitted by Mathematica Policy Research to the Centers for Medicare & Medicaid Services, February 2008), www.policyarchive.org/handle/10207/bitstreams/8795.pdf.