Contract No.: 500-95-0047 (09)
MPR Reference No.: 8756-320

MATHEMATICA
Policy Research, Inc.

The CenVaNet Medicare Coordinated Care Demonstration Program After One Year

Final Report

March 17, 2005

Nancy Archibald
Jennifer Schore
Randall Brown
Deborah Peikes
Sean Orzol

Submitted to:

Centers for Medicare & Medicaid Services
Office of Strategic Planning
C30-20-17
7500 Security Boulevard
Baltimore, MD 21244

Project Officer:
Carol Magee

Submitted by:

Mathematica Policy Research, Inc.
P.O. Box 2393
Princeton, NJ 08543-2393
Telephone: (609) 799-3535
Facsimile:(609) 799-0005

Project Director:
Randall Brown

ACKNOWLEDGEMENTS

Many individuals contributed to the preparation of this report. We would like to thank CenVaNet's program staff including Michael Mattews, Dr. Robert Scott, Suzanne Walker, Julie LaPrade, and Ed Williford for their time in answering our many questions about the operation of their program. In addition, we extend our thanks to CenVaNet's care managers: Jane Bechtel, Susan Dugan, Ashley Love, Leslie Saul, Mollie Tinsley, and Denez Yancey. Their examples of typical care manager-patient interactions provided invaluable insight into CenVaNet's care management model. We especially thank three CMS staff members—Carol Magee (project officer for the evaluation), Cindy Mason (project officer for the demonstration), and Renee Mentnech (Director, Division of Beneficiary Research) for their overall guidance and ongoing support.

Several other staff members at Mathematica Policy Research made important contributions to this report. Programmers Amy Zambrowski, Nazmul Khan, Stephanie Chin, and Licia Gaber skillfully processed Medicare claims data, Medicare enrollment data, and program data. Bob Schmitz provided valuable critical comments on an earlier draft of the report. Patricia Ciaccio edited and Jane Nelson produced this report. Any remaining errors or omissions are the responsibility of the authors.

CONTENTS

CONTENTS *(continued)*

Page

TABLES

TABLES *(continued)*

Table **Page**

EXECUTIVE SUMMARY

The Medicare Coordinated Care Demonstration, mandated by the Balanced Budget Act of 1997, is testing models aimed at improving the care of chronically ill beneficiaries with Medicare fee-for-service coverage. Fifteen programs are participating in the demonstration sponsored by the Centers for Medicare & Medicaid Services (CMS). Mathematica Policy Research, Inc. (MPR) is evaluating the demonstration using both implementation analysis and impact analysis based on a randomized design. This report is one of a series that will describe each program during its first year and will provide estimates of its impact on Medicare service use and costs during the first six months of program operation.

Research over the past decade suggests that successful care coordination usually has several features. These include effective ***patient identification, highly qualified staff, physician buy-in,*** and ***financial incentives*** aligned with program goals. Successful programs also offer a well-designed, structured intervention that includes:

- A multifaceted assessment whose end product is a ***written care plan*** that can be used to monitor patient progress and that is updated as the patient's condition changes
- A process for providing ***feedback to care coordinators, program leaders, and physicians*** about patient outcomes
- ***Patient education*** that combines the provision of factual information with techniques to help patients change self-care behavior
- Procedures for ***integrating fragmented care***, ***facilitating communication*** among providers and, when necessary, ***arranging for community services***

The ultimate purpose of this report series is to assess the extent to which demonstration programs have these features, as well as to describe early enrollees in the program and their Medicare service use and costs during the first few months after enrollment. Information for the report comes from telephone and in-person contacts with program staff and analysis of Medicare and program-generated data. The next report series will focus on Medicare service use and costs over a longer time and will include all first-year enrollees.

This report describes CenVaNet's Medicare Coordinated Care Demonstration (MCCD) program. After presenting an overview of the CenVaNet MCCD, the report addresses the following questions: Who enrolls in the program? To what extent does the program engage physicians? How well is the program implementing its approaches to improving patient health and reducing health care costs? What were enrollees' Medicare service use and costs during its first months of operation? Thereafter follows a discussion of the program's strengths and unique features, as well as potential barriers to program success.

Program Organization and Approaches. CenVaNet, a provider of care management services, was created in 1996 as a managed care risk contractor by the 11-hospital Central

Virginia Health Network and a group of physician investors. CenVaNet itself includes a network of approximately 800 primary and specialty care physicians. From 1997 to 2000, CenVaNet contracted with CIGNA for Seniors, a Medicare + Choice plan, to provide care management for 1,000 Medicare beneficiaries with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), and diabetes. This prototype program received positive feedback from physicians and participants, but it was never formally evaluated.

CenVaNet's MCCD program operates from the organization's Richmond, Virginia headquarters. Key staff for the program include project, medical, and finance directors; a project manager; a care management supervisor; and care coordinators (called "care managers" in this program). All are employed by CenVaNet and work from CenVaNet's headquarters. The program's medical director is a geriatrician who provides medical oversight for all care management activities.

The program's intervention focuses on improving patient health and reducing the use of costly health care services by (1) improving patients' self-care skills and adherence to treatment recommendations, and (2) promoting better communication and coordination between patients and providers. The program educates patients about their conditions and the need to manage their own care, while giving them the skills and tools to do so. The program also teaches patients how to communicate with their physicians more effectively and to organize and schedule their own care. Program staff believe that only minimal collaboration with physicians is required to implement this approach. The program does not expect to influence physicians' clinical practice patterns, but it would like them to recognize the value of care management.

Patient Identification. In April 2002, CenVaNet's MCCD program began enrolling patients who had been treated for heart disease, cerebrovascular disease, diabetes, or COPD in the previous 12 months. To participate, patients must be at moderate or high risk for hospital admission as determined by the PraPlus™ screening questionnaire. In addition, as in all the MCCD demonstration programs, beneficiaries must also meet three CMS requirements: (1) be enrolled in Medicare Parts A and B, (2) not be in a Medicare managed care plan of any kind, and (3) have Medicare as their primary payer. CenVaNet identifies potential participants from lists of eligible patients generated from the medical records information systems of the four CenVaNet network physician practices the program targeted in its first year. Physicians review the lists to determine if any of their patients are unsuitable for the demonstration. The program then sends approved patients a letter describing the program, printed on the physician's letterhead and signed by the physician, encouraging them to participate. Program staff follow up the letter with a telephone call to determine if patients are interested and to administer the screening questionnaire. The program's enrollment staff obtain patients' informed consent during an in-home visit. All patients who enrolled during the first year were identified from the network's two largest cardiology practices, largest ophthalmology practice (to identify patients with diabetes), and largest primary care physician group practice.

Patient Assessment, Care Planning, and Monitoring. The program conducts a comprehensive in-home assessment for all patients following enrollment that covers the patient's medical history; current medical, psychosocial, and functional status; medications; financial and social issues; end-of-life planning; in-home safety; need for transportation; family and social supports; and education needs. The care managers enter the assessment information into

InformaCare™, the program's care management software, which automatically generates a care plan template. They then customize the template to the needs and goals of each patient. The care managers update the care plans at least every six months and when patients experience a change in status. The care managers do not conduct formal reassessments, but they reassess patients informally at each follow-up contact and after major events such as hospitalizations.

The care managers use information obtained from the assessment and their own clinical judgment to assign patients to one of four acuity levels, which determine the frequency of monitoring contacts. The highest-acuity patients receive weekly or more frequent monitoring, high-acuity patients receive weekly or biweekly monitoring, moderate-acuity patients receive biweekly or monthly monitoring, and low-acuity patients receive monthly monitoring. Monitoring contacts occur by telephone or in person. During monitoring contacts, the care managers conduct patient education, reassess patients' status, and evaluate patients' progress toward meeting care plan goals. If patients have urgent problems outside of normal office hours, they are instructed to call 911 or their physician's office.

CenVaNet's MCCD program also used an in-home monitoring device, called the "Health Buddy," between October 2002 and September 2003 to monitor 74 treatment group patients with CHF or diabetes. Each day, patients use the Health Buddy to answer questions about their health and symptoms. The care managers review their responses and follow up with patients if they report a problem or their data show an abnormal result. Depending on what they find, the care managers may recommend that patients followup with their physicians. Staff believe the Health Buddy will encourage patient adherence and self-reliance, but they have not yet determined if it has had any effect on patients' clinical outcomes.

Staffing and Program Quality Management. Maintaining and improving care quality and ensuring that programs attain their goals both require that staff have adequate qualifications, training, and supervision and that management has the tools and support to monitor program progress toward its goals. CenVaNet uses both nurses and social workers as care managers. Nurse care managers must be registered nurses (preferably baccalaureate-prepared) with two years' recent case management experience and some managed care experience (such as utilization review). At the end of its first year, five of the eight nurse care managers were baccalaureate- or master's-prepared, and three were certified care managers. Social worker care managers must have a master's degree in social work and a minimum of three years' experience in inpatient or community case management in adult or geriatric medicine. Social work care managers co-manage patients who have psychosocial problems with nurse care managers. The care management supervisor trains new care managers during two weeks of structured orientation and observation. She completes an orientation checklist as each care manager moves through the training period. In addition, she directly observes care managers' interactions with their first few patients. The care management supervisor conducts quarterly case management reviews in which she reviews a five percent sample of each care manager's caseload. All care managers attend biweekly care conferences and periodic in-service training.

The program monitors its operations using reports that track the (1) status of potential enrollees in the recruitment process, (2) number and acuity level of patients assigned to each care manager, and (3) quality of its intervention (through quarterly case reviews described earlier). In addition, at the end of the first year of operation, the program had started to collect data on care

managers' performance and patients' clinical and behavioral outcomes (such as whether they can competently measure their blood pressure) and planned to start generating reports from these data for the program's management and patients' physicians to use. CenVaNet surveys its patients regarding their satisfaction with the program. The program had planned to survey its physicians but has decided not to do so because MPR is conducting its own physician survey, and it did not want to burden physicians with another one.

WHO ENROLLS IN THE PROGRAM?

The program met its enrollment target for the first year of operation. By April 2003, CenVaNet had enrolled 518 patients in the evaluation treatment group and 515 in the control group. Program staff attributed this success to the close relationships they had built with referring physicians when their managed care patients participated in the prototype program and to the program's marketing efforts before the start of the demonstration.

To gain another perspective on the appeal of the program to beneficiaries, the evaluation simulated the program's eligibility criteria using Medicare enrollment and claims data to estimate the percent of eligible beneficiaries participating in the CenVaNet MCCD. The simulation showed that 39,447 beneficiaries met the eligibility criteria, roughly two percent of whom enrolled in the MCCD during the program's first six months of operation. (The time lag associated with processing Medicare claims data precluded the use of a longer reference period for this report.) The pool of eligible beneficiaries who did not enroll, however, likely includes many who were not patients of the four medical practices from which the program recruited most of its patients during this period.

Program participants differed from eligible nonparticipants along a number of dimensions. They were more likely than eligible nonparticipants to be ages 75 to 84 (50 versus 41 percent) but less likely to be between 65 and 74 (37 versus 45 percent) (Table 1). Participants were more likely than eligible nonparticipants to be male (53 versus 40 percent) but less likely to be nonwhite (16 versus 24 percent) or eligible for Medicaid (7 versus 10 percent). (The evaluation used July 15, 2002, the midpoint of the six-month enrollment period used in this analysis, as a pseudo-enrollment date for nonparticipants.) For each of the chronic conditions the MCCD targeted, participants had a higher prevalence than eligible nonparticipants: coronary artery disease (74 percent of participants versus 42 percent of nonparticipants), CHF (65 versus 22 percent), diabetes (47 versus 38 percent), and COPD (48 versus 33 percent). As a result of their poorer health, participants were more likely to have been hospitalized in the year before enrollment (49 percent of participants versus 26 percent of nonparticipants). Participants also had significantly higher average monthly Medicare expenditures over the year before enrollment ($1,121 versus $507 for eligible nonparticipants).

As part of the program's waiver application, MPR estimated that Medicare costs would average $1,248 per month for eligible beneficiaries who did not participate in the program. It thus appears that the program has enrolled patients who have costs similar to the estimates, with average monthly costs of $1,121 before enrollment.

Table 1

Characteristics of MCCD Participants and Eligible Nonparticipants During First Six Months of Program Intake (Percent, Except as Noted)

	Participants[a]	Eligible Nonparticipants
Age at Intake		
Younger than 65[b]	0.0	0.0
65 to 74	37.4	44.7
75 to 84	49.7	41.1
85 or older	12.8	14.2
Male	52.9	39.9
Nonwhite	16.0	23.6
Medicaid Buy-In for Medicare A or B	6.9	10.1
Medical Conditions Treated in Past Two Years		
Coronary artery disease	74.4	42.3
Congestive heart failure	64.5	21.9
Diabetes	46.5	38.0
Chronic obstructive pulmonary disease	48.2	32.5
Hospital Admission in Past Year	48.7	26.0
Hospital Admission in Past Month	4.7	3.3
Total Medicare Reimbursement per Month (Dollars)	$1,121	$507
Number of Beneficiaries	**764**	**38,745**

Source: Medicare Enrollment Database and National Claims History.

Note: For participants the intake date is their date of enrollment. For eligible nonparticipants it is July 15, 2002, the midpoint of the six-month enrollment period covered by the participation analysis.

[a]Participants who do not meet CMS's Medicare requirements for the demonstration or who had invalid Health Insurance Claim (HIC) numbers on MPR's enrollment file are excluded from this table because Medicare service use data were not available. Participants who are members of the same household as a research sample member are included above, but are not part of the research sample.

[b]The CenVaNet MCCD excludes beneficiaries younger than 65.

The program is conducting a survey to obtain feedback on patient satisfaction with the MCCD program and with interactions with their care managers. Of the 263 surveys returned to the program thus far, 95 percent of patients said that they were very or extremely satisfied with care management, and 88 percent felt their care manager had helped them make better-informed decisions about their care. Voluntary disenrollment during the first six months of operations was low—just 6 patients out of 374, or approximately two percent. A few disenrolled because they believed they were too healthy to need the program's services, while the others became disinterested once they understood what the program entailed.

TO WHAT EXTENT DOES THE PROGRAM ENGAGE PHYSICIANS?

To minimize the burden it places on physicians, CenVaNet's care management model requires relatively little of physicians. The program expects that physicians will (1) permit their office staff to generate lists of potentially eligible patients; (2) review the patient lists to determine program appropriateness; and (3) respond to care managers' requests for information about, and assistance with, specific patients.

As noted, during its first year, CenVaNet's MCCD program enrolled patients from four CenVaNet network physician group practices caring for large panels of patients having the program's target diagnoses. Through prior projects, several MCCD administrative staff and care managers had relationships with these physicians, many of whom also cared for patients enrolled in CenVaNet's prototype care management program. CenVaNet's network management staff foster the program's relationships with all network physicians through monthly newsletters to physicians, quarterly practice visits by network coordinators, and e-mail communications to practice administrators.

Staff reported that they had no other strategies to promote relationships between care managers and physicians. They rely on the fact that their care managers know when it is appropriate to contact physicians. In addition, the care managers have cultivated relationships with the nurse or nurse practitioner in each office so they can contact physicians quickly when necessary. Improving physicians' clinical practice is not a goal of CenVaNet's program because the program's medical director believes that most area physicians practice in accordance with published guidelines. The program addresses clinical management problems on a case-by-case basis by prompting patients to ask their physicians for recommended care rather than by contacting physicians themselves to alert them that care does not follow practice guidelines.

On the other hand, the program would like physicians to recognize the value of care management and to see care managers as a resource for patients. Therefore, the program sends physicians a monthly newsletter detailing the program's progress in patient enrollment and eventually including data on patient outcomes that will empirically demonstrate the program's effectiveness. Moreover, relationships between a few physicians and care managers have developed after the physicians have seen the care manager in action (for example, when care managers dealt with difficult hospital discharge planning issues). The program staff believe that, through these interactions, physicians are beginning to see the value of care coordination.

HOW WELL IS THE PROGRAM IMPLEMENTING KEY INTERVENTION APPROACHES?

Improving Patient Adherence. Improving adherence through patient education is one of two major approaches that the CenVaNet MCCD program has taken to improve patient health. Education begins with a self-management tool administered as part of the initial assessment to determine the areas in which the patient needs instruction and how much instruction the patient needs. For each condition it targets, the program uses teaching guidelines and educational materials embedded in its care management software. The software links patients' problems to appropriate teaching materials. In addition, the program has developed its own patient education handbooks for diabetes, CHF, and COPD based on national clinical practice guidelines. Although the care management software provides a structured, comprehensive approach to delivering education, care managers tailor education to each patient's acuity level, educational level, and cognitive ability. The program considers its teaching method to be for the individual rather than a one-size-fits-all approach.

While the program does not require care managers to have specific training or experience in patient teaching, most are baccalaureate-prepared nurses with home health, public health, or geriatric nursing backgrounds, which the program believes has provided them with the necessary teaching skills. New care managers receive an orientation to the program's disease-specific teaching modules and are trained in the standards of care for each target condition. The program refers patients who require more extensive teaching (such as education for a patient newly diagnosed with diabetes) to outside sources. These education providers bill Medicare directly for their services. To determine if patients understand educational messages, the care managers (1) listen to patients describe their behaviors; (2) periodically reassess patients' self-management skills with the tool used at enrollment; and (3) review patients' clinical measures, such as blood pressure or blood sugar levels. If it appears that a patient's knowledge of his or her condition is not improving, the care manager may modify the care plan goals or focus on more attainable goals.

Among the 374 patients enrolled in CenVaNet's MCCD program during its first six months, 77 percent had received at least one contact for self-care or disease-specific education, 49 percent had received a contact to explain a medication, and 36 percent had received at least one contact to explain a test or procedure. Although the program aims to provide education at every contact, during the period examined, about a quarter of the patients enrolled had not yet been assessed. Many of those who did not have a contact for education probably were still being assessed.

Improving Communication and Coordination. The program's other major approach to improving patient health is to improve communication between patients and physicians and to improve coordination of care. The program teaches patients to communicate more effectively with their physicians by teaching them how to (1) present the physician with information about their signs and symptoms, (2) ask the physician for clarifying information when necessary, and (3) prompt physicians to provide care recommended in evidence-based guidelines. The care managers give each patient a condition-specific "Standard of Care Card" to bring to physician visits. On one side, patients can record self-monitoring data (such as weight or peak flow measures) that physicians would find useful in managing the patient's care. The other side

contains guidelines to remind physicians when necessary tests or procedures are due. The program also helps patients choose among alternative courses of treatment suggested by their physicians by teaching them to ask their physicians for clarifying information (such as the risks, benefits, recovery time, and outcomes of the treatment in question). In this way, the program hopes that patients will be better able to make informed decisions. The program also sends formal patient status reports to physicians once a year as a direct means of communication between the care managers and physicians.

In addition to teaching patients how to coordinate care on their own, the program has several strategies to improve coordination of care. The program must rely on patients and families to report when a patient is hospitalized or has been seen in the emergency room. However, when a care manager does find out about an adverse event, she reviews the incident with the patient to try to identify what led up to it. Although the program usually does not learn of an adverse event until after it occurs, this does not seem to cause a problem because the program's care managers do not usually interact directly with a hospital or skilled nursing facility's staff around discharge planning issues. It prefers to leave these activities to the home health agency or skilled nursing facility that will be caring for the patient after discharge. The program also tries to resolve polypharmacy issues among program patients. When a care manager uncovers a polypharmacy issue (such as a medication interaction), she sends the primary care physician a clinical report listing all the patient's medications with a letter noting her concerns. The care managers also help patients resolve situations in which they feel that they are receiving conflicting advice from their physicians. In such cases, the care managers provide the patient with additional information and, perhaps, a list of questions to ask the physician. They also may recommend that the patient get a second opinion.

The program tried other strategies to promote communication and coordination but felt that these other strategies were not succeeding. The program had asked physicians' offices to regularly send updated information from patients' medical records. However, the physicians' offices usually did not respond to these requests because office staff felt they required too much effort. The care managers now ask for information only when it is absolutely necessary, or they ask the patients to request this information themselves. In addition, the program had allowed patients' physicians to have Web-based access to their patients' records in the program's care management information system, but the physicians did not use it because they found the system difficult to navigate.

WHAT WERE ENROLLEES' MEDICARE SERVICE USE AND COSTS?

This report provides preliminary estimates of the effect of the CenVaNet MCCD program on the Medicare service use and costs of treatment group patients during the first two months after enrollment for an early cohort of enrollees. Thus, these differences between the treatment and control groups for this period may not reflect the true effects of the program over a longer time. Except for the likelihood of using outpatient hospital services (such as diagnostic testing), there were no statistically significant differences between the two groups in Medicare service use. However, the significantly greater use of outpatient hospital services by the treatment group in the first few months after enrollment could result in a reduced need for more expensive services in the future. The total Medicare Part A and B costs for the treatment group, exclusive of demonstration costs, were $2,872, on average, during the first two months after enrollment,

compared with $1,899 for the control group. Although substantial, this difference just missed statistical significance at the ten-percent level (p=0.102); and may reflect chance differences in preenrollment costs between the two groups. It is too soon to tell whether these early differences in Medicare costs will persist through the rest of the demonstration. However, at $145 for the first month of care and $80 per patient per month thereafter, CenVaNet's MCCD has one of the lowest fees of any program in the MCCD. Thus, only a modest percentage of savings is required for the program to attain cost neutrality.

CONCLUSION

Program Strengths and Unique Features. CenVaNet's MCCD program has many of the features associated with effective care coordination programs, plus some unique features.

- The program targets patients with diagnoses typically associated with high health care costs and accepts only those assessed as being at moderate to high risk for future costs. The program has enrolled patients whose pre-enrollment expenses are as high as anticipated.

- The program enrolled the number of patients it targeted for its first year of operation. The program staff attribute this success to the close relationships they had built with referring physicians and to the program's marketing efforts before the start of the demonstration.

- Care managers conduct comprehensive assessments to identify patient needs. InformaCare, the program's care management information system, generates a care plan based on this assessment that care managers then further tailor to individual patient needs. Care plans are updated as patient needs change. Patients are monitored by telephone or in person in the patient's home at a frequency determined by their acuity level. InformaCare also reminds care managers when such contacts are due.

- The care managers and program leadership use reports generated by InformaCare to monitor patient and program progress. The program has begun to collect data on patients' clinical and behavioral outcomes, which it plans to share with physicians in the aggregate.

- Patient education, targeted to each patient's learning needs, combines disease-specific written guidelines with visual aids, materials suggested by InformaCare related to the patient's care plan goals, and outside educational resources. The program facilitates communication between patients and physicians by providing patients with tools to monitor their own care and report information to their physicians, while teaching patients what care they need and empowering them to ask for it.

- Care managers are either registered nurses or clinical social workers with significant community-based experience. The care management supervisor uses tools, including direct observation of care manager interactions with patients, to monitor the quality of the intervention the care managers are providing.

- The program gained physician support before the demonstration began by visiting offices and explaining the program to physicians and office administrators. After patients enroll, the program places few burdens on physicians' time. Care managers understand when it is appropriate to ask the physicians to become involved in the care coordination process.

Potential Barriers to Program Success. One possible barrier to the program's success is that, because the program requires minimal physician involvement, care managers have little opportunity to build relationships with patients' physicians and involve them in the care coordination process. Without these relationships, physicians may not trust the care managers' recommendations, call on them as a resource to help their patients, or tell them about changes in patients' status or medical regimens. However, the program has taken this approach to physicians because they believe they cannot realistically expect physicians to actively participate in a fee-for-service care coordination program. Given the program's approach of teaching patients to manage their own care (including initiating contact with their physicians when problems arise) and of developing relationships with physicians' office staff as communications conduits to physicians, the program's minimal direct contact between physicians and care managers may not be a problem. Indeed, CenVaNet's care coordination model may provide a useful comparison to other demonstration programs that expect a higher degree of physician involvement.

Another possible barrier to success is the lack of timely information alerting care managers to patient hospitalizations or emergency room visits because the program relies entirely on patient self-reports of such events. Although the program staff do not believe that relying on patient and family self-reports of adverse events is problematic, this approach reduces the care manager's opportunity to determine if patients understand their discharge instructions or to review new medications that have been prescribed. Moreover, timeliness is important since, if care managers are able to clarify instructions and review new medications patients receive from hospital staff immediately after such events, they are more likely to be able to help patients reduce the need for further hospital or emergency room use.

It remains to be seen whether the CenVaNet MCCD model of care coordination can reduce hospitalizations and other avoidable expenses despite these potential shortcomings. The data available for this report covered a time period too early to be indicative of its eventual effectiveness. However, the program is enrolling patients with serious health problems and high health care costs and the cost of its intervention is relatively low. Thus, it would need to make only modest improvements in patient health and modest proportional reductions in Medicare costs to meet demonstration budget neutrality goals.

INTRODUCTION

The Medicare Coordinated Care Demonstration, mandated by the Balanced Budget Act of 1997, is testing models aimed at improving the care of chronically ill beneficiaries with Medicare fee-for-service coverage. Fifteen programs are participating in the demonstration sponsored by the Centers for Medicare & Medicaid Services (CMS). The programs are hosted by organizations as diverse as hospital systems, disease management vendors, and retirement communities and are serving patients in 16 states and the District of Columbia. Mathematica Policy Research, Inc. (MPR) is evaluating the national demonstration, through both impact and implementation analyses.[1]

This report is one of a series that will describe each program during its first year of implementation and provide preliminary estimates of its impact on Medicare service use and costs. First, it briefly describes the data and methodology used in these reports and presents an overview of the program that is the focus of this report. It then addresses the following questions: Who enrolls in the program? To what extent does the program engage physicians? How well is the program implementing its approaches to improving patient health and reducing Medicare costs? What were enrollees' Medicare service use and costs during its first months of operation? The report concludes with a discussion of the program's strengths and unique features, as well as potential barriers to its success.[2]

This report describes CenVaNet's Medicare Coordinated Care Demonstration (MCCD) project. CenVaNet is a provider of care management services located in Richmond, Virginia.

[1]Lovelace Health System's CMS Medicare Case Management Demonstration for Congestive Heart Failure and Diabetes Mellitus is also part of the MPR evaluation. Appendix Table A.1 lists the host for each demonstration program in the evaluation, as well as each program's service area and target diagnoses.

[2]For a more detailed description of CenVaNet's plans for demonstration implementation and its early experiences, see Archibald and Schore (2003).

CenVaNet's MCCD project began enrolling Medicare beneficiaries with heart disease, cerebrovascular disease, diabetes, or chronic lung disease in April 2002.

DATA SOURCES AND METHODOLOGY

Implementation Analysis. The evaluation's implementation analysis uses information gathered during telephone interviews with program staff conducted approximately three months after the program began enrolling patients and in-person interviews conducted approximately six months later. For each site, one of three MPR implementation team members conducted the telephone and in-person interviews using semistructured protocols. The interviews covered the following topics: organization and staffing; targeting and patient identification; program goals; care coordination activities (such as assessment, patient education, and service arranging); physician attitudes toward the program and interventions with physicians; quality management; record keeping and reporting; and financial monitoring. Use of the protocols ensured that each interviewer collected as consistent a set of information for each program as possible, while allowing the interviewer to explore issues of specific importance to each program. The structure of the protocols also makes synthesizing findings across programs more efficient. MPR staff also reviewed written materials provided by each program, including its proposal to CMS, its operational protocol, materials it provided to patients and physicians, and forms used in its operation. (Appendix Table A.2 contains a full list.) This analysis also includes an examination of data each program collected specifically for the evaluation describing care coordinator contacts with patients, patient disenrollment, and services the program purchased for patients during its first six months of operation.

Participation Analysis. The evaluation uses Medicare claims and eligibility data to estimate the number of beneficiaries in the CenVaNet MCCD program's service area who were

eligible for the program and the percentage who actually enrolled during the program's first six months of operations. Beneficiaries are identified as eligible if, for any month between April and October 2002, they (1) lived in the program's service area, (2) were enrolled in Medicare Parts A and B, (3) had Medicare as the primary payer, (4) were not in a Medicare managed care (Medicare + Choice) plan, and (5) met the program's target diagnosis and service use requirements (described in detail in Appendix B). The midpoint of the six-month enrollment period examined in this analysis—July 15, 2002—is used as a pseudo-enrollment date for nonparticipants; the actual enrollment date is used for participants. Participants and eligible nonparticipants were then compared with respect to demographic characteristics, diagnoses, and utilization histories to determine the extent to which participants are typical of the pool of eligible beneficiaries.

Impact Analysis. This report also presents early impact estimates based on key study outcomes. The evaluation's impact analysis is based on the random assignment of consenting, eligible Medicare beneficiaries to either receive the program intervention in addition to their regular Medicare benefits or to receive only their regular Medicare benefits as usual. Comparison of outcomes for the two groups will yield unbiased estimates of the impact of care coordination. Disenrollees are not excluded from the analysis sample because doing so would introduce unmeasured, preexisting differences between the treatment and control groups that random assignment is meant to avoid.

The report provides two types of comparisons of estimated treatment and control group means for Medicare-covered service use and costs. The first uses outcomes measured over the first two months after random assignment for beneficiaries who enrolled in the program during its first four months. The second compares treatment and control group means for each calendar

month after program startup, using all sample members enrolled through the end of each month, to observe any trends in treatment-control differences over time.

In this report, the impact of the program's intervention is estimated as the simple difference in mean outcomes between treatment and control patients. T- and chi-squared tests are used to establish whether differences are statistically significant. The next round of site-specific reports will use regression to adjust for any chance baseline differences between the two groups that arose despite random assignment. (Appendix B describes in more detail the methods used to obtain Medicare data, construct variables, and choose analysis samples.)

The treatment-control comparisons presented in this report may not reflect the true long-term impacts of the program, for several reasons. First, the comparisons are based on a relatively small sample (only patients enrolling during the first four months of program operations). Second, the outcomes are measured too soon after patient enrollment to expect programs to be able to have sizable impacts. (The timetable for the evaluation's first Report to Congress defined the observation period for this report.) Third, program interventions may change over time as staff gain more experience with the specific patients they have enrolled. Finally, if programs change their eligibility criteria or the type of outreach they conduct, they may enroll different types of patients over time.

Despite these shortcomings, the treatment-control differences are presented to provide some limited feedback to the programs on how the two groups compare. Later analyses will examine Medicare service use and cost impacts over a longer time and will include all enrollees during the program's first 12 months. These analyses will also examine patient outcomes based on telephone interviews with treatment and control group members. Interview-based outcomes include the receipt of preventive health services, general health behaviors, self-management,

functioning, health status, and satisfaction with care, as well as disease-specific behaviors and health care.

OVERVIEW OF THE CENVANET MCCD PROGRAM

Program Organization and Relationship to Physicians. CenVaNet was created by the 11-hospital Central Virginia Health Network and 350 physician investors in 1996 as a managed care risk contract organization. CenVaNet has a network of approximately 800 primary and specialty care physicians. All 350 physician investors are members of CenVaNet's network.

In 1997, CenVaNet contracted with CIGNA for Seniors, a Medicare + Choice plan, to provide care management and network services. Under this contract, CenVaNet provided care management to 1,000 Medicare beneficiaries with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), and diabetes between 1997 and 2000. This prototype program received positive feedback from physicians and participants, but it was never formally evaluated.

The key staff for the current MCCD program include project, medical, and finance directors; a project manager; a care management supervisor; and the care coordinators (called "care managers" in this program). CenVaNet employs all these staff, and all of them work from CenVaNet's offices in Richmond. The program's medical director is a geriatrician who provides medical oversight for all care management activities. The care managers are registered nurses and social workers. One year after its start, the program had enrolled 518 treatment group patients and had the equivalent of eight full-time care managers for a care manager-to-patient ratio of 1 to 65.

During the first year of the demonstration, CenVaNet's MCCD program enrolled patients from four CenVaNet network physician practices (Virginia Cardiovascular Specialists,

Cardiovascular Associates of Virginia, Virginia Eye Institute (to identify patients with diabetes), and Virginia Healthsource) caring for large panels of patients having the target diagnoses. The demonstration's project director estimated that approximately 40 percent of the physicians in these groups are CenVaNet investors. Several of CenVaNet's MCCD administrative staff and care managers have relationships with these physicians, many of whom also cared for patients enrolled in CenVaNet's prototype care management program. CenVaNet's network management staff foster the program's relationships with all network physicians by implementing communication and education processes, such as a monthly newsletter to physicians, quarterly practice visits by network coordinators, and e-mail communications to practice administrators.

Program Approaches. The program's intervention focuses on improving patient health and reducing the use of costly health care services by (1) improving patients' self-care skills and adherence to treatment recommendations, and (2) promoting better communication and coordination between patients and providers. To this end, the program educates patients about their conditions and the need to manage their own care, while giving them the skills and tools to do so. The program also teaches patients to communicate with their physicians more effectively and to organize and schedule their own care. To implement the program's approach, only minimal collaboration between care managers and physicians is required. The program does not expect to influence physicians' clinical practice patterns, but it would like them to recognize the value of care management.

Target Criteria and Patient Identification. The CenVaNet MCCD program targets patients in the greater Richmond area with CHF; ischemic, hypertensive, or other heart disease; cerebrovascular disease; diabetes; or chronic lung disease. Patients must be at moderate or high

risk for hospital admission as determined by the PraPlus™ screening questionnaire.[3] The program excludes patients who are younger than age 65 or who have a diagnosis of end-stage renal disease, HIV/AIDS, or a major mental disorder. The program also excludes patients who are organ transplant recipients or candidates. In addition, beneficiaries participating in any of the 16 demonstration programs must meet CMS's insurance payer and coverage requirements for the demonstration—be enrolled in Medicare Parts A and B, not be in a Medicare managed care plan of any type, and have Medicare as their primary payer.

CenVaNet identifies potential participants from lists of eligible patients that physician office staff generate from the medical records information systems of physicians in the four target practices. After a physician's office staff produce a list, the physician reviews the list to determine if any of the listed patients would be unsuitable for referral to the demonstration. The CenVaNet MCCD program then sends all patients deemed suitable a letter printed on the physician's letterhead and signed by the physician. The letter describes the program and invites patients to participate.

Program staff follow up the letters with a telephone call. Initially, the care managers made these calls, but now dedicated enrollment staff members are responsible for making these contacts (see Appendix C for telephone script). If a patient is interested in the program, the enrollment staff member administers the PraPlus screening questionnaire to verify eligibility. Program staff schedule an in-home visit with eligible patients to answer any questions they have about the program and obtain their informed consent (see Appendix C for a copy of the form).

[3]PraPlus is a 17-item screening questionnaire, which identifies elderly people at high risk for future use of health services. It has been shown to be a valid predictor of future utilization (Pacala et al. 1997). The CenVaNet MCCD uses only the first eight items on the PraPlus (concerning previous hospitalizations and physician visits and diagnoses of specific chronic conditions) to screen for eligibility. The program does not consider the remaining items (concerning functional status, living arrangements, depression, etc.) to be useful in determining program eligibility, but they are part of the initial assessment that occurs after enrollment.

All the patients who enrolled during the first year were identified from lists generated by CenVaNet's two largest cardiology practices (to identify patients with CHF and other types of heart disease), the network's largest ophthalmology practice (to identify patients with diabetes), and the largest primary care physician group practice. The program has not needed to expand the pool of CenVaNet physician practices from which it receives patient lists. The program has had a few direct referrals from physicians and a few patient self-referrals. However, the program discourages these referrals because of the randomized design of the demonstration. It does not want to create disappointment when a patient is assigned to the control group.

Assessment, Care Planning, and Monitoring. The program conducts a comprehensive assessment for all new patients to determine their needs. The initial assessment, called the "assessment profile" (see Appendix C for a copy), was developed by the program itself based on the tool it used for its prototype CIGNA care management program. The assessment profile covers the patient's medical history; current medical, psychosocial, and functional status; medications; financial and social issues; end-of-life planning; in-home safety; need for transportation; and family and social supports. The care manager completes the assessment profile in person in the patient's home. The care manager will involve the patient's caregiver or family members as appropriate. All information comes from the patient, his or her caregiver or family members, and his or her physicians (as opposed to medical records). Because of the comprehensive nature of the assessment profile, it takes an average of one and a half hours to complete. During the first home visit, the care manager also completes a self-management assessment (see Appendix C) that identifies patients' education needs. The program expects the care managers to call new patients within a day or two to introduce themselves and requests that the care managers complete their assessments within two weeks.

In addition to the assessment profile, the program collects disease-specific assessment information using an "initial contact questionnaire" developed by InformaCare™ (see Appendix C for a copy). This questionnaire is mailed to all patients within their first month of enrollment. The program staff estimate that 75 percent of patients complete the questionnaire on their own and mail it back to the program. The care managers administer the questionnaire by telephone to the other 25 percent of patients who do not complete it on their own. The program enters the data from the initial contact questionnaire into InformaCare. InformaCare does not contain data fields for the information from the assessment profile. The care managers enter these data into InformaCare free text fields. The program does not conduct formal reassessments with the full array of tools used initially, but the care managers reassess patients informally with each follow-up contact and after major events such as hospitalizations.

Between April 8 and October 6, 2002, 374 patients enrolled and had been randomly assigned to the CenVaNet MCCD's treatment group (Table 1). Seventy-five percent of patients (281 of 374) had at least one contact for assessment; among these, approximately 30 percent had their first contact within two weeks of enrollment. Staff had hoped to complete all patient assessments within two weeks. Completing assessments took longer than expected, however, because the care managers were responsible for conducting both patient recruitment and initial patient assessments during the first six months of operations.

The care managers develop care plans based on the results of the initial assessment. When the care managers enter the results of the initial contact questionnaire into InformaCare, the software automatically generates a care plan template based on nursing diagnoses and a problem list (see Appendix C for a copy of the "Care Manager Feedback Report"). The care managers

TABLE 1

CARE COORDINATOR CONTACTS WITH PATIENTS
DURING FIRST SIX MONTHS

Number of Patients Enrolled[a]	374
Number of Patients with at Least One Care Coordinator Contact (Percent)	302 (81)
Total Number of Contacts for All Patients	1,526
Average Number of Contacts per Patient, Among those Contacted	5
Number of Care Coordinators Contacting Patients[b]	10
Among Those Patients with at Least One Contact:	
Percentage of contacts care coordinator initiated	92.1
Percentage of contacts by telephone	76.7
Percentage of contacts in person at patient's residence	22.9
Percentage of contacts in person elsewhere	0.4
Of All Patients Enrolled, Percentage with Assessment Contact	75.1
Among Those Patients with an Assessment, Percentage of Patients Whose First Assessment Contact Is:	
Within a week of random assignment	4.6
Between one and two weeks of random assignment	25.3
More than two weeks after random assignment	70.1
Of All Patients Enrolled, Percentage of Patients with Contacts for:	
Routine patient monitoring	55.3
Providing emotional support	8.3
Providing disease-specific or self-care education	77.0
Explaining tests or procedures	36.1
Explaining medications	49.2
Monitoring abnormal results	10.4
Identifying need for non-Medicare services[c]	23.0
Identifying need for Medicare services	10.2
Monitoring services	9.1
Average Number of Patients Contacted per Care Coordinator	30.2
Average Number of Patient Contacts per Care Coordinator	152.6

Source: CenVaNet program data received August 2002 and updated November 2002. Covers six-month period beginning April 8, 2002, and ending September 30, 2002.

[a]Number of patients enrolled in the treatment group as of October 4, 2002.

[b]Includes eight care managers, the care management supervisor, and the project manager.

[c]Includes assistance applying for public programs.

then customize this template to the needs and goals of each patient. The care plans include personalized short- and long-term goals regarding adhering to medical regimens and making lifestyle changes, as well as the resources needed to achieve these goals. The care managers update the care plans at least every six months, as well as if the patient has experienced a change in status. The care plan serves as a guide for all the care managers' patient contacts. Patients' physicians do not provide input to, or review, care plans, but they do receive copies of them. Patients do not receive a copy of their individualized care plan. Instead, they receive a general list of goals for their diagnosis (see Appendix C for a copy of the "Patient Care Plan and Agreement for Diabetes Care Management").

Patients' assigned acuity level governs the frequency of monitoring contacts. The care managers use information obtained from the assessment profile and initial contact questionnaire and their own clinical judgment to assign patients to one of four acuity levels according to the guidelines in the program's Acuity Level Rating Table (see Appendix C). Level IV patients (the highest acuity) receive weekly or more frequent monitoring, Level III patients receive weekly or biweekly monitoring, Level II patients receive biweekly or monthly monitoring, and Level I patients receive monthly monitoring. Care managers monitor patients by telephone or in-person visits. However, the mode of contact is at the discretion of the care managers, some of whom favor in-person visits more than others. During monitoring contacts, the care managers conduct patient education, reassess patients' status, and evaluate patients' progress toward meeting care plan goals. The care managers document the results of the contact in InformaCare. If patients have urgent problems outside of normal office hours, they are instructed to call 911 or their physician's office.

Of the 374 patients enrolled in the first six months of operation, more than 80 percent had at least one contact with a care manager, and the average patients had five contacts. Most patient

contacts (92 percent) were initiated by care managers, and most (77 percent) were by telephone. Among all patients enrolled, 55 percent had received a contact from a care manager for routine monitoring.

In addition to regular monitoring contacts by the care managers, CenVaNet used an in-home monitoring device, called the "Health Buddy," to monitor some treatment group patients. From October 2002 to September 2003, the program gave Health Buddy devices to patients with CHF or diabetes who had a sixth- to eighth-grade reading level, were not visually impaired, and had a land-based telephone line. The Health Buddy connected to patients' telephone lines. Each day, patients answered questions about their health and symptoms by pressing buttons on the Health Buddy. The data were transmitted to the care managers, who reviewed the data and followed up with the patients if they reported a problem or their data showed an abnormal result. As of February 2003, 74 patients had been given a Health Buddy device. The program staff said they liked the Health Buddy because it encouraged patient adherence and self-reliance. They felt the device had great educational value and promoted patient adherence. For example, the daughter of one patient told the care manager that her mother had never tested her blood sugar before but was now doing so with the help of the Health Buddy.

In addition to the relatively small number of patients given a Health Buddy device, all patients (in theory) could use the Internet to access self-monitoring tools in InformaCare. For example, one patient measures his blood sugar and blood pressure and enters these values into InformaCare, which displays them graphically.[4] However, few patients actually use these tools. Approximately one year into the demonstration, only about 12 patients were using InformaCare's self-monitoring tools (down from about 24 patients earlier in the program). The

[4]If a patient enters a monitoring value outside the normal range, InformaCare will display a message instructing the patient to contact his or her care manager. The care manager will also receive an alert message.

care managers reported that few demonstration patients owned computers, so most could not access these tools. Moreover, the program had begun to discourage the use of these tools because InformaCare did not provide technical support for patient users and the program did not have the time or resources to answer users' questions.

Staffing and Program Quality Management. Maintaining and improving care quality and ensuring programs attain their goals both require that staff have adequate qualifications, training, and supervision and that managers have the tools and support to monitor the program's progress toward its goals. CenVaNet requires its nurse care managers to be registered nurses (preferably baccalaureate-prepared) with two years' recent case management experience and some managed care experience such as case management, utilization review, or network and benefits management. In addition, a minimum of five years' adult or geriatric clinical experience is preferred. Social worker care managers are required to have a master's degree in social work and a minimum of three years' experience in inpatient or community case management in adult or geriatric medicine. At the end of the first year of operation, the program had the equivalent of eight full-time nurse care managers and one full-time social worker care manager. The care management supervisor believes that the care manager-to-patient ratio of 1:65 works well for the program. However, she believes that the care managers could accommodate a higher caseload if the program reassigned some of care managers' documentation responsibilities to other staff. The social workers do not carry an independent caseload, but they manage patients together with a nurse care manager.

The care management supervisor directs the training of new care managers during two weeks of structured orientation and observation. Training covers the MCCD program design, information systems, the care management process, disease-specific standards of care, and guidelines for data collection and documentation. The care managers observe the care

management supervisor as she interacts with patients. The care management supervisor then observes the care managers as they make their first patient contacts. The care management supervisor completes an orientation checklist as each care manager moves through the training period (see Appendix C).

On an ongoing basis, the care management supervisor conducts a quarterly case management audit in which she reviews a five percent sample of each care manager's caseload. She uses a checklist to assess the completeness of data collection for each patient, the consistency of that patient's care with program policies and procedures, and the appropriateness of the frequency of care manager contacts with the patient. In addition, all care managers attend biweekly care conferences and periodic in-service training.

The program uses a variety of tools to monitor its operations. It tracks the status of potential enrollees in the recruitment process. It monitors the quality of its intervention through quarterly case audits described above. CenVaNet's MCCD also is able to generate reports that monitor the number of patients assigned to each care manager, along with the patient's diagnosis and acuity level (see Appendix C). At the end of the first year of operation, the program planned to develop reports to track care managers' performance and patients' clinical and behavioral outcomes (such as whether they can competently measure their blood pressure). By fall 2003, the program had started to collect data on these measures.

The program also tracks complaints from patients. The project manager logs all complaints into the program's care management information system. All complaints should be resolved within one day. The program has received two formal complaints, one related to a patient's assignment to the control group and the other to a patient's misunderstanding of the services offered by the program.

CenVaNet's board of directors meets bimonthly. The demonstration's management staff attend these meetings to report on the program's activities, including patients' (1) enrollment and disenrollment, (2) acuity levels, and (3) use of in-patient and emergency services. The staff also have presented patient case studies to the board and demonstrated the Health Buddy monitoring device.

CenVaNet surveys its patients regarding their satisfaction with the program. Approximately one year after the start of the demonstration, the program had received approximately 20 completed surveys (see Appendix C for a copy of the patient survey). It enters the data from these surveys into a database and monitors the feedback patients provide. If a patient has a criticism of the program, it is not logged as a complaint, but the program staff will contact the patient to address it. For example, a few patients expected the care managers to provide hands-on nursing care. Another patient believed that the program contacted him too frequently. In response to these complaints, the project manager contacted these patients to clarify how the program operates and what services it offers. The program had planned to survey its physicians. It has decided not to do so, however, because MPR is conducting its own physician survey and the program did not want to overburden the physicians with another one.

WHO ENROLLS IN THE PROGRAM ?

The program was able to meet its enrollment target within the first year of operation (April 2003). The program staff attributed this success to the close relationships they had built with referring physicians when their managed care patients participated in the prototype program and to the program's marketing efforts before the start of the demonstration. Participants' Medicare expenses in the year before program intake are very close to those projected in the program's Medicare waiver estimates. Thus, the program appears to have enrolled its intended target

population. A survey conducted by the program shows that the majority of patients are satisfied with the program. Few voluntarily disenrolled in the program's first six months.

Enrollment After One Year. After one year of operation, CenVaNet had enrolled 518 patients in the evaluation treatment group and 515 in the control group (MPR Weekly Enrollment Report, week ending April 13, 2003). This met the program's target of enrolling roughly 1,000 patients in the first year. The enrolled population represents approximately 26 percent of the 4,000 CenVaNet network patients the program believed would be eligible.

The program staff reported that the rate of patient acceptance of the program has been higher than they anticipated. Approximately 40 percent of patients the program telephoned after receipt of an invitation letter enroll in the program.[5] Another 32 percent of patients are found to be ineligible during the follow-up telephone call, and 27 percent refuse to participate. The program did not track the reasons for nonparticipation.

The program staff attribute much of their success in patient enrollment to CenVaNet's close relationship with the physicians in its network and, particularly, with those physicians in its target practices. Many of the physicians in these practices are investors in CenVaNet and, therefore, have a financial interest in the demonstration program's success. In addition, the demonstration's project director believes that the physicians trust the program with their patient data. CenVaNet has built a reputation with the physicians over the years, and the physicians understand that CenVaNet would not misuse confidential data.

In addition, CenVaNet fosters its relationship with its physicians through frequent communication. CenVaNet used its monthly newsletter to tell all the physicians in its network

[5]The program staff had estimated that only about 25 percent of eligible patients would agree to participate. However, because the program does not conclusively determine whether a patient is eligible before the telephone call, we cannot say what percent of eligible participants agree to participate.

about its participation in the demonstration. In the months leading up to the start of the demonstration, CenVaNet's director of network management and the demonstration's project director (who is also CenVaNet's president) visited the administrator of each of the four target practices to obtain their support for the demonstration and discuss the process for identifying patients. The director of network management and the demonstration's medical director (who is also CenVaNet's medical director) visited with many of the physicians in these four practices to explain the demonstration and discuss the program's expectations of physicians.

Percent of Eligible Beneficiaries Participating. To gain another perspective on the proportion of eligible beneficiaries enrolling in the program and their characteristics, the evaluation simulated the program's eligibility criteria using Medicare enrollment and claims data. (Appendix B contains a detailed description of the simulation.) The simulation found that 39,447 beneficiaries (38 percent of all Medicare beneficiaries in the area) were eligible for CenVaNet's MCCD program between April and October 2002, the program's first six months of operation. That is, they met CMS's three criteria for all demonstration programs, lived in the program's service area, and met the program's clinical eligibility criteria.[6] During the same six months, 702 eligible beneficiaries enrolled in the demonstration (1.8 percent of the 39,447 eligible beneficiaries).[7] (See Tables B.2 and B.3.) The pool of eligible beneficiaries who did not

[6]Between April and October 2002, 103,120 beneficiaries were living in the program's service area. Of those, 10,702 (10 percent) would have been ineligible for the program because they did not meet one of CMS's demonstrationwide criteria. Of the remaining 92,418 beneficiaries who met these criteria, 39,447 (43 percent) also met the program's diagnostic and service use criteria at some point during the six-month intake window, and they had none of its exclusion criteria (to the extent they could be simulated with the Medicare data). (See Table B.2.)

[7]In fact, 784 beneficiaries actually enrolled in the program during its first six months. When estimating the participation rate, the evaluation excludes enrollees with invalid Health Insurance Claim (HIC) numbers on MPR's enrollment file, and those who did not meet CMS's demonstrationwide criteria, or the program's geographic, diagnostic, utilization, or exclusion criteria (as measured using Medicare data). These enrollees were excluded from the participation analysis to use a consistent definition of eligibility for the numerator and denominator of the ratio. (Beneficiaries with invalid HIC numbers may well be eligible, but the beneficiary's Medicare data could not be obtained to assess that, so they were excluded. HIC numbers for them have since been corrected.) This leaves 702 known *eligible* participants. Most of the reduction was due to beneficiaries having one or more of the program's

enroll includes many who were not patients of the four medical practices from which the program recruited most of its patients during this period.

The CenVaNet MCCD estimated the size of its pool of eligible beneficiaries at 4,000—about 10 percent of our simulated estimate. This is primarily because the program estimate is based only on the number of CenVaNet patients with the target diagnoses and in fee-for-service Medicare during the year before the start of the demonstration, while our simulation includes all eligible beneficiaries in the Richmond area.

Comparison of Participants and Eligible Nonparticipants. Program participants differed from eligible nonparticipants along a number of dimensions. They were somewhat older than eligible nonparticipants, less likely to be nonwhite (16 versus 24 percent), and more likely to be male (53 versus 40 percent) (Table 2). Participants also were less likely to be eligible for Medicaid: 7 percent of participants, compared with 10 percent of eligible nonparticipants). Participants were more likely than eligible nonparticipants to have certain chronic conditions. During the two years before enrolling, 74 percent of participants had been treated for coronary artery disease, 65 percent for CHF, 48 percent for COPD, 47 percent for diabetes, and 34 percent for stroke—the target diagnoses for the MCCD. In addition, 26 percent of participants were treated for cancer and 21 percent for peripheral vascular disease. Nonparticipants had lower rates of all these chronic conditions and had an average of 2 of 9 chronic conditions examined, compared to 3.3 for participants.

(continued)
exclusion criteria according to the Medicare data. The comparison of eligible nonparticipants in Table 2, however, excludes only participants with invalid HIC numbers and those who did not meet the Medicare demonstration-wide requirements, leaving 764 participants. Thus, the comparison more closely reflects the differences between all actual participants and those who were eligible to participate but did not.

TABLE 2

CHARACTERISTICS OF ALL PARTICIPANTS AND ELIGIBLE NONPARTICIPANTS DURING THE FIRST SIX MONTHS OF PROGRAM ENROLLMENT
(Percentages, Unless Otherwise Noted)

	Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants
Age at Intake		
Average age (in years)	77.0	76.3**
Younger than 65	0.0	0.0
65 to 74	37.4	44.7***
75 to 84	49.7	41.1***
85 or older	12.8	14.2
Male	52.9	39.9***
Nonwhite	16.0	23.6***
Original Reason for Medicare: Disabled or ESRD	8.1	6.6
State Buy-In for Medicare Part A or B	6.9	10.1***
Newly Eligible for Medicare (Eligible Less than Six Months)	0.0	0.0
Enrolled in Fee-for-Service Medicare 6 or More Months During Two Years Before Intake	99.9	99.8
Medical Conditions Treated During Two Years Before Month of Intake[b]		
Coronary artery disease	74.4	42.3***
Congestive heart failure	64.5	21.9***
Stroke	33.7	25.8***
Diabetes	46.5	38.0***
Cancer	25.8	21.0***
Chronic obstructive pulmonary disease	48.2	32.5***
Dementia (including Alzheimer's disease)	2.5	4.0**
Peripheral vascular disease	21.0	12.2***
Renal disease	10.1	4.9***
Total Number of Diagnoses (number)	3.3	2.0***
Days Between Last Hospital Admission and Intake Date[b]		
No hospitalization in past two years	34.2	61.0***
0 to 30	4.7	3.3**
31 to 60	5.0	2.9***
61 to 180	18.4	9.7***
181 to 365	20.6	10.1***
366 to 730	17.2	13.2***
Annualized Number of Hospitalizations During Two Years Before Month of Intake[b,c]		
0	34.6	61.4***
0.1 to 1.0	39.3	29.2***
1.1 to 2.0	15.5	7.0***
2.1 to 3.0	6.0	1.7***
3.1 or more	4.6	0.8***

TABLE 2 *(continued)*

	Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]		
Part A	$717	$280***
Part B	$404	$228***
Total	$1,121	$507***
Distribution of Total Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]		
$0	0.5	0.9
$1 to 500	50.3	75.0***
$501 to 1,000	14.7	9.9***
$1,001 to 2,000	15.9	7.7***
More than $2,000	18.6	6.5***
Number of Beneficiaries	**764**	**38,745**

Source: Medicare Enrollment Database and National Claims History File.

Note: The intake date used in this table is the date of enrollment for participants. For eligible nonparticipants, the intake date is July 15, 2002, the midpoint of the six-month enrollment period examined.

[a]Participants who do not meet CMS's demonstration-wide requirements for the demonstration or had an invalid HIC number on MPR's enrollment file are excluded from this table because we do not have Medicare data showing their reimbursement in the fee-for-service program. Members of the same households as the research sample members are included.

[b]Calculated among beneficiaries with six or more months in Medicare fee-for-service in the two years before intake. (See Note, above, concerning intake date definition.)

[c]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). For example, if a beneficiary was in fee-for-service all 24 months and had two hospitalizations during that time, they would have one hospitalization per year [(12 x 2) / 24]. If another beneficiary was in fee-for-service eight months during the previous two years, and had two hospitalizations during those eight months, they would have [(12 x 2) / 8], or three hospitalizations per year. The estimate of the proportion with no hospitalization in the two years before the month of intake may differ slightly from the proportion with no hospitalization in the two years before the date of intake because the two measure slightly different periods. Someone enrolled on September 20, 2003, whose only hospitalization in the preenrollment period occurred on September 5, 2003, would not be counted as hospitalized during the 24 months before the month of intake. Conversely, someone hospitalized on September 25, 2001, would be captured in the measure defined by month of enrollment, but not in the measure based on the day of enrollment.

*Difference between participants and eligible nonparticipants significantly different from zero at the .10 level, two-tailed test.

**Difference between participants and eligible nonparticipants significantly different from zero at the .05 level, two-tailed test.

***Difference between participants and eligible nonparticipants significantly different from zero at the .01 level, two-tailed test.

As a result of their poorer health, participants were more likely to have been recently hospitalized and had higher Medicare reimbursements than eligible nonparticipants. About half of all participants had a hospitalization in the year before enrollment, compared with about a quarter of eligible nonparticipants. Participants had monthly Medicare expenditures of $1,121 over the year before enrollment whereas nonparticipants' average monthly Medicare expenditures were only $507.[8] Both of these differences are highly statistically significant.

As part of the program's waiver application, MPR estimated that Medicare costs would average $1,248 per month for eligible beneficiaries who did not participate in the program. It thus appears that the program has enrolled patients who have costs similar to the estimates, with average monthly costs of $1,121 before enrollment.

Satisfaction and Voluntary Disenrollment. Staff believe that patients are highly satisfied with the program, and many have enrolled to help the government improve Medicare for others. The program is conducting a patient satisfaction survey to obtain feedback on how well patients like the MCCD program and their interactions with their care managers. As of spring 2004, the program had sent out 435 surveys (at one year after the patient's enrollment) and received 263 replies. Ninety-five percent of patients said they were very or extremely satisfied with care management, and 88 percent felt their care manager had helped them make better-informed decisions about their care.

Patients may stay in CenVaNet's program for the duration of the demonstration (that is, until April 2005). Of the 374 (treatment group) patients who enrolled over the first six months of operation, 44 percent had been enrolled for 10 weeks or less, 35 percent had been enrolled between 11 and 20 weeks, and 21 percent had been enrolled for 21 weeks or more (Table 3).

[8]The evaluation uses July 15, 2002, as a pseudo-enrollment date for nonparticipants because it is the midpoint of the six-month intake period used in this analysis. Actual enrollment dates are used for participants.

TABLE 3

DISENROLLMENT FOR PATIENTS ENROLLED DURING FIRST SIX MONTHS

Number of Patients Enrolled[a]	374
Length of Enrollment as of October 15, 2002 (Percentage of Patients Enrolled)	
10 weeks or less	44
11 to 20 weeks	35
21 or more weeks	21
Mean Length of Enrollment (Weeks)	12
Number of Patients Who Disenrolled	18
Number Who Disenrolled Because:	
Patient died	8
Patient lost program eligibility[b]	1
Patient initiated disenrollment	6
Program assessed patient as uncooperative	3
Number Disenrolling:	
Within a week of random assignment	1
Between 1 and 4 weeks	8
Between 5 and 12 weeks	5
More than 12 weeks	4

Source: CenVaNet program data received August 2002 and updated November 2002. Covers six-month period beginning April 8, 2002, and ending September 30, 2002.

[a]Number of patients enrolled in the treatment group as of October 4, 2002.

[b]Patients can lose program eligibility for the following reasons: joined a managed care plan, Medicare no longer primary payer, developed renal disease treated with dialysis, moved to a nursing home, or moved out of the program's service area.

Voluntary disenrollment during the first six months of operations was low—just 6 patients of 374, or approximately two percent. A few patients asked to disenroll because they believed they were too healthy to need the program's services. Others became disinterested once they understood what the program entailed. Another eight patients died, and one lost program eligibility during that period.

TO WHAT EXTENT DOES THE PROGRAM ENGAGE PHYSICIANS?

While the importance to program success of engaging eligible beneficiaries is self-evident, engaging physicians is also critical. Care managers must develop trusting, collaborative relationships with primary care physicians for physicians to feel comfortable communicating important information to them about their patients (for example, medication changes, new problems identified during office visits, or areas for additional patient education) and to feel that information the care managers give them is credible and warrants their attention (for example, regarding problems in the home environment that affect patients' health, functional deficits that patients do not tell physicians about, or reminders about providing preventive care). A trusting, respectful relationship will also facilitate care managers' access to physicians when urgent problems arise, and will facilitate communication and coordination across medical care providers (Chen et al. 2000). Moreover, to increase acceptance of care management among physicians in general, care managers would naturally need to engage physicians.

CenVaNet's care management model requires physician assistance in identifying potential patients and responding to care managers' requests concerning specific patients. The model is designed so that care managers supplement the care provided by physicians rather than working collaboratively with them. This approach keeps interactions with physicians to a minimum to avoid placing additional burdens on their time. The CenVaNet MCCD program seeks to gain

physician acceptance of care management as a means to making their practice more efficient but does not try to change physicians' clinical practice.

Collaboration. Physicians are important to CenVaNet's demonstration, but their role is limited by design to prevent overburdening them. The program expects that physicians will (1) permit their office staff to generate lists of potentially eligible patients, (2) review the patient lists to determine if they are appropriate for the demonstration, and (3) respond to care managers' requests for information and assistance about specific patients. Identifying patients posed few difficulties for the program because the physician practices referring patients are part of the CenVaNet physician network and familiar with CenVaNet's care management activities. Moreover, physicians are familiar with many of the demonstration staff from CenVaNet's prototype care management program, and they have regular interactions with CenVaNet's network management staff.

The program staff reported that they had no other strategies to promote relationships between care managers and physicians. They tended to rely on the fact that their care managers are aware of when it is, and is not, appropriate to contact physicians. In addition, the care managers have tried to cultivate relationships with the nurse or nurse practitioner in each office so they can contact physicians quickly when necessary. They have found that it is often easier to communicate with physicians through their staff rather than trying to speak with physicians directly.

Nevertheless, relationships between a few physicians and care managers have developed when the physicians have actually had an opportunity to see the care manager in action. The program has had some very positive responses from physicians to the care managers' work around hospital discharge planning. Care managers have attended discharge planning meetings for some patients and have been instrumental in getting plans of care in place. One physician

had been reluctant to accept correspondence from a care manager, but after she attended an office visit to resolve a polypharmacy issue, the physician has a better understanding of the care manager's role and has been very helpful in communicating with her. Through the provision of such assistance, physicians are beginning to respect the care managers' expertise.

The care management supervisor reported that there are advantages and disadvantages of the program's approach to interacting with physicians. The advantages are that the program does not overburden physicians with information and that patients become more accountable for their own care and more comfortable interacting with their physicians. In addition, this approach eliminates the burden on care managers of having to send reports to physicians when there have been no changes in a patient's status. The disadvantages of this approach are that physicians may not remember that the patient is enrolled in the care coordination program. Also, patients sometimes fail to communicate information from their physicians to their care managers.

Improving Practice. Improving physician practice is not a goal of CenVaNet's demonstration program. The program's medical director believes that most physicians in the area already practice in accordance with clinical practice guidelines. The program will address patient management problems on a case-by-case basis. If a physician is not following the recommendations of a guideline for a particular condition, the care manager prompts the patient to ask for the care recommended. If the physician insists that the recommended test is not needed, the care manager will remind the patient of why the test is necessary and suggest that the patient could consider changing physicians if they believe they are not receiving the care they need. The program staff reported that one patient did change her physician because she did not feel she was being treated appropriately. Care managers do not themselves contact physicians to alert them that the care they are providing does not follow the recommendations of clinical

practice guidelines. Anecdotally, the program staff believe that, thus far, physicians find the program helpful.

On the other hand, CenVaNet would like physicians to recognize the value of care management and to see care managers as a resource for patients. To this end, the program sends physicians a booklet that details the prototype program's impact on costs and patient outcomes and a monthly newsletter promoting the program detailing the program's progress in patient enrollment. The program plans to include data on patient outcomes when they are available. The program's management also plans to provide physicians with data on the demonstration patients' clinical outcomes to show them that care coordination is effective. The staff believe that the combination of care managers' positive interactions with physicians and their office staff and proof of clinical effectiveness will convince physicians of the value of care management.

HOW WELL IS THE PROGRAM IMPLEMENTING KEY INTERVENTION APPROACHES?

Improving Patient Adherence. The staff believe that improving patients' understanding of their illness and adherence to medical regimens are key approaches to improving their self-reliance, quality of life, and health—all program goals. The program provides patient education to support these approaches. Education begins with a self-management tool administered as part of the initial assessment to determine whether patients are competent, somewhat competent, need partial instruction, or need full instruction in six areas: (1) monitoring their disease processes (for example, testing blood sugars); (2) taking medications correctly; (3) understanding their prescribed diet; (4) understanding the relationship between following their medical regimen and developing complications; (5) understanding symptoms and when action needs to be taken; and (6) participating in appropriate exercise and activities. In addition, the care managers determine patients' education level and gauge their reading ability so that they can select appropriate

written materials. The program does not use a curriculum. Instead, for each condition it targets, the program uses teaching guidelines and educational materials embedded within InformaCare. The software links patients' problems to appropriate teaching materials. For example, if a patient with diabetes has consistently high blood glucose levels, the software will recommend that the care manager provide the patient with an education sheet entitled "Monitoring Your Blood Sugars." [9] In addition to these materials, the program has developed its own patient education handbooks for diabetes, CHF, and COPD based on national clinical practice guidelines.[10] The program also sends a newsletter to all patients covering both general topics (such as reminders to get flu shots) and disease-specific topics (such as reminders to patients with heart failure to weigh themselves daily and report changes to their physician) (see Appendix C for a copy of a newsletter). The program encourages patients to put teaching into practice by providing scales, pill boxes, and peak flow meters to those who cannot afford them.

The program's approach to education varies according to patients' acuity level, educational level, and cognitive ability. For all patients, the care managers focus on patients' immediate education needs. For patients at higher acuity levels, the care managers may, at first, concentrate on teaching patients to take their medications correctly or to recognize when they need to call their doctors.[11] For patients at lower acuity levels, the care managers may start right in teaching patients about making lifestyle changes, such as losing weight or getting more exercise. The program staff reported that many patients with CHF have benefited from the program's teaching

[9]Patients using InformaCare directly can access these materials on their own.

[10]Although some of the program's patients are not native English speakers, the care managers report that these patients can speak and read English. Therefore, the program's materials are all written in English.

[11]High-acuity patients are not necessarily more seriously ill than low-acuity ones. They may have been rated as high acuity because they have a cognitive impairment or an unstable living situation. Thus, not all high-acuity patients require intensive education.

because they did not understand why they were supposed to weigh themselves daily. Many had been told to weigh themselves by their physicians, but they thought the physician just wanted them to not gain weight. They did not understand that they were supposed to be watching for fluid weight gain. The care managers helped them understand the purpose of daily weighing.

The program considers its teaching method to be for the individual rather than a one-size-fits-all approach. The program employs nontraditional methods if usual teaching methods fail. For example, one care manager set up a medicine box using a color-coded egg carton for an illiterate patient. If a patient has a cognitive deficit, the care manager will simplify the materials presented, or, more often, will involve the patient's caregiver in teaching. For patients with low literacy levels, the care managers use visual aids to facilitate teaching.

The care managers provide most patient education. The program does not require care managers to have specific patient teaching training or experience, but since most are baccalaureate-prepared nurses with home health, public health, or geriatric nursing backgrounds, the program believes that they have the necessary teaching skills. New care managers receive an orientation to the program's disease-specific teaching modules and are trained in the standards of care for each target condition.

The program refers patients who require more extensive teaching to outside sources. For example, a patient with newly diagnosed diabetes who requires a week of daily in-home teaching may be referred to Matria Healthcare, a provider of diabetes disease management and diabetes supplies. Matria bills Medicare directly for the services it provides to program patients. Other diabetes education programs include the Diabetes Treatment Center of America in Richmond and the Chippenham Diabetic Center. These education providers bill Medicare directly for the services they provide to demonstration patients. CenVaNet also refers patients to local cardiac

and pulmonary rehabilitation programs. The program staff estimate that they refer approximately 25 percent of demonstration patients to these outside teaching resources.

The care managers use three strategies to determine if patients understand educational messages. First, they listen to patients describe their activities and behaviors. Second, they periodically reassess patients' self-management skills with the assessment tool used at enrollment. Third, they review patients' clinical measures, such as blood pressure or blood sugar levels. If it appears that a patient's knowledge of his or her condition is not improving, the care manager may modify the care plan goals or focus on more attainable goals. The care managers commented that the most common reason that patients do not adhere to their medical regimen is not because they lack motivation, but because of knowledge deficits. The care managers recalled one patient with CHF who firmly stated that he did not eat salt—however, he did not realize that the bacon he ate regularly contained high levels of sodium. The care managers also commented that many people had received education about their condition, but this may have been many years ago when they were first diagnosed. If a patient understands his condition and has the motivation to improve self-management but is still not improving, the care manager will try to identify other barriers, such as inadequate financial resources or a lack of social supports, that may be preventing improved adherence, then work to remove these barriers.[12]

The care managers provide education during every patient contact. Among the 374 patients enrolled in CenVaNet's MCCD program during its first six months, 77 percent had received at least one contact for self-care or disease-specific education, 49 percent had received a contact to explain a medication, and 36 percent had received at least one contact to explain a test or procedure (Table 1). Although the program aims to provide education at every contact, during

[12]The program will disenroll patients who refuse to take part in the intervention. The program disenrolled three patients for this reason within the first six months of operations (Table 3).

the period examined, roughly a quarter of the patients enrolled had not yet been assessed. It is likely that many of those who did not have a contact for education were also still being assessed.

CenVaNet appears to have implemented a strong education intervention. The program has implemented a comprehensive patient education intervention that focuses on identifying and removing barriers that prevent patients from taking a more active role in their own care. The program uses structured education guidelines that can be individualized to the needs of each patient and the program emphasizes improving self-care and communication with providers. The program is confident that, because of their prior experience, the care managers have the skills they need to effectively educate patients. To best meet patients' learning needs, the care managers combine education resources available in house with education and support groups available in the community. The care managers monitor whether patients appear to be incorporating this learning into their daily activities and into their interactions with providers. Moreover, the program monitors the effectiveness of its education intervention by measuring patients' clinical outcomes. If patients do not appear to be attaining education goals, the care managers will modify or refocus patients' care plan goals.

Improving Communication and Coordination. The program's primary strategy to improve communication and coordination is for the care managers to teach patients to communicate more effectively with their physicians by presenting the physician with information about their signs and symptoms and asking the physician for clarifying information when necessary and by teaching patients to prompt physicians to provide care recommended in evidence-based guidelines. The care managers give each patient a condition-specific "Standard of Care Card," on one side of which they can record self-monitoring data, such as their blood pressure, blood sugar, weight, and peak flow measures that physicians would find useful in managing patients' care (see Appendix C for an example of a Standard of Care Card). Patients

are instructed to bring these cards to their physician visits. The other side of the Standard of Care Card contains guidelines to remind physicians when necessary tests or procedures are due. The care managers teach patients to recognize signs and symptoms and to call their physician or care manager when needed. The program gives each patient an information sheet to keep at home to remind the patient and alert caregivers, family members, or emergency medical personnel whom to contact in an emergency. The program believes that most patients are capable of this kind of proactive communication. If the patient cannot communicate with his or her physician effectively, the care managers will try to involve caregivers or family members. The care managers use the same teaching strategies to get the caregiver or family member to present information to the physician, ask for more information, or prompt the physician to provided recommended care.

The program promotes patient-physician communication to help patients choose among alternative courses of treatment. By teaching patients to ask their physicians for clarifying information, the program hopes that patients will be better able to made informed decisions. However, the care management supervisor reported that for approximately 10 to 15 percent of patients, the physician recommends one course of treatment without (the care manager believes) adequately describing alternative treatments. In such cases, the care manager will tell the patient that other options exist and recommend that the patient seek another opinion. However, the care manager will not explain what these options are or try to guide the patient's choice of treatment.

The program must rely on patients and families to report when a patient is hospitalized or has been seen in the emergency room. However, when the care manager does learn of an emergency room visit or unplanned hospitalization, she reviews the incident with the patient to try to identify the events leading up to it. The care manager reviews with the patient how to provide more information to the physician, what signs and symptoms to watch for, and what the

patient should do differently the next time. For example, one patient was hospitalized repeatedly because he was not taking his medications. The care manager discovered that each month he would run out of medication before he received his benefit checks and, therefore, had no money to fill the prescriptions. The care manager changed his medication schedule so that he could refill his prescriptions immediately after receiving his checks.

The program staff believe that finding out about adverse events after the fact does not hinder their ability to coordinate care because the care managers do not usually interact directly with a hospital or skilled nursing facility's staff around discharge planning issues. The program prefers the care managers to leave these activities to the home health agency or skilled nursing facility that will be caring for the patient after discharge. However, the care managers will collaborate with a hospital or skilled nursing facility's staff if the patient or health care provider requests it.

The CenVaNet MCCD program also tries to resolve polypharmacy issues among program patients. When a care manager uncovers such an issue, she sends the primary care physicians a clinical report from InformaCare listing all the patient's medications. Her cover letter to the physician will suggest that he or she act as the coordinator among all the prescribing physicians to resolve the polypharmacy issue. If the primary care physician does not take on this role, the care manager will communicate with all the physicians to resolve the issue.

The care managers promote coordination of care by helping patients resolve situations where they feel they are receiving conflicting advice from their physicians. In such cases, the care managers provide the patient with additional information and, perhaps, a list of questions to ask the physician. They also may recommend that the patient get a second opinion.

The program sends formal patient status reports to physicians once a year as a direct means of communication between the care managers and physicians. The program had planned to send these reports quarterly, but CenVaNet's board of directors suggested a change from three to six

months, believing that three months was too short an interval because, from past experience, they knew that physicians did not usually respond to these reports. Subsequently, the program decided to change the frequency of reports from 6 to 12 months because it had received little feedback from physicians regarding the 6-month reports and believed that their benefit was outweighed by the time and expense required to prepare them. The only cases in which reports are sent more frequently are those in which patients have experienced an adverse event or change in status.

The program has tried other strategies to promote communication and coordination of care that have not been as successful as those described above. The program tried to ask physicians' offices to send updated information from a patient's medical record. The program requests this information to ensure that condition-specific standards of care are being met. The information requested includes hemoglobin A1C levels, lipid levels, blood pressure measurements, flu and pneumonia vaccinations, microalbuminuria results, and eye and foot examinations. However, the staff have found that they must be careful not to ask too much from physicians' offices. In one instance, the office photocopied the patient's entire record and billed the program for it. Now the care managers ask for information from physicians' offices only when it is absolutely necessary, or they ask the patients to request this information themselves.

The program also had planned to improve coordination of care by allowing patients' physicians to have Web-based access to their patients' care management records in InformaCare. The program's medical director reported that the physicians have not been using InformaCare because they found it difficult to navigate. Thus, this potential avenue for coordination was not realized.

CenVaNet has implemented several strategies that seem likely to increase communication and coordination. The primary strategy appears to be teaching patients to communicate more

effectively with their physicians and to be more proactive in coordinating their own care. The care managers give patients the tools and information they need to monitor their own clinical status and teach them to ask clarifying questions of physicians and to prompt physicians for care specified in published treatment guidelines. Program patients are asking physicians for needed care, and many reported through the program's patient survey that their care manager has helped them make better decisions about their care.

Increasing Access to Services. Increasing access to services is not a major focus of CenVaNet's program, and the program does not pay for services on behalf of patients. The care manager will refer patients to, or arrange on their behalf, a wide range of community-based services, however. The most commonly arranged services are personal care, education regarding long-term care options, medication assistance, transportation, and adult day care. The program provides scales, peak flow meters, and pill boxes to patients who need them. The staff do not track the provision of these goods to individual patients, but they commented that only a handful of patients have needed these items.

During its first six months of operations, the program did not purchase any support services for patients. However, approximately 23 percent of patients received help from a care manager who referred them to, or arranged for, non-Medicare covered services. A smaller proportion of patients (10 percent) received help arranging for Medicare-covered services (Table 1).

WHAT WERE ENROLLEES' MEDICARE SERVICE USE AND COSTS?

This report provides preliminary estimates of the effect of CenVaNet's MCCD program on Medicare service use and expenditures. These early estimates must be viewed with caution, as they are not likely to be reliable indicators of the true effect of the program over a longer period. Due to lags in data availability, analysis for this report included only an early cohort of enrollees

(those enrolling during the first four months of program operation) and allowed observation of their experiences during their first two months in the program. The estimates thus include patients' experiences only during the program's first six months of operation, when staff still may have been fine-tuning the intervention. Moreover, the program may enroll patients with quite different characteristics over time.

With only one exception, there were no statistically significant differences between the treatment and control groups in Medicare service use during the first two months after random assignment (Table 4). There was a nine percentage point difference in the use of outpatient hospital services (such as laboratory tests). Fifty-eight percent of treatment group members used such services, compared with 49 percent of control group members. This greater use of outpatient hospital services by the treatment group in the first few months after enrollment could result in a reduced need for more expensive services in the future. Total Medicare Part A and B costs for the treatment group, exclusive of demonstration costs, were $2,872, on average, during the first two months after enrollment, compared with $1,899 for the control group. This treatment-control difference of $973, or 51 percent, although sizable and due primarily to higher Part A costs, is not statistically significant at the .10 level (p=0.102), and may reflect chance differences in preenrollment costs between the two groups. The treatment costs increase by $150 over the first two months (or $75 per month; on average) when one takes into account the CMS payment to the MCCD, increasing the treatment-control difference of $973 to $1,223.[13]

Table 5 presents monthly trends in treatment-control differences from April through September 2002, the first six months of program operation. The sample enrolled the first month

[13] The per-member-per-month payment for this program is $145 for the first month and $80 for the following months. Since Table 4 covers the first two full calendar months after random assignment (typically months two and three), program payments would be $160 over that two-month period. The lower mean payments in Tables 4 and 5 may have resulted from billing errors, payment delays, or payment adjustments for patients who disenrolled.

TABLE 4

MEDICARE-COVERED SERVICE USE DURING THE TWO MONTHS AFTER THE MONTH OF RANDOMIZATION, FOR EARLY ENROLLEES

	Treatment Group	Control Group	Difference[a]
Inpatient Hospital Services			
Any admission (percent)	13.4	12.6	0.8
Mean number of admissions	0.17	0.17	0.01
Mean number of hospital days	1.33	1.17	0.16
Emergency Room Services			
Any emergency room encounters (percent)			
Resulting in admission	9.1	7.7	1.4
Not resulting in admission	6.5	8.6	–2.1
Total	15.6	15.8	–0.2
Mean number of emergency room encounters			
Resulting in admission	0.11	0.09	0.01
Not resulting in admission	0.08	0.09	–0.02
Total	0.19	0.19	0.00
Skilled Nursing Facility Services			
Any admission (percent)	0.9	0.9	0.0
Mean number of admissions	0.01	0.01	0.00
Mean number of days	0.24	0.16	0.08
Hospice Services			
Any admission (percent)	0.9	0.5	0.4
Mean number of days	0.32	0.13	0.19
Home Health Services			
Any use (percent)	8.2	5.9	2.4
Mean number of visits	0.81	0.55	0.27
Outpatient Hospital Services[b]			
Any use (percent)	58.4	49.1	9.3**
Physician and Other Part B Services[c]			
Any use (percent)	88.3	91.9	–3.6
Mean number of visits or claims	4.7	4.8	–0.1
Mortality Rate (percent)	2.2	2.2	–0.1
Total Medicare Reimbursement[d]			
Part A[e]	$1,848	$1,085	$763
Part B	$1,024	$814	$210
Total	$2,872	$1,899	$973
Reimbursement for Care Coordination[f]	$150	$0	$150***
Number of Beneficiaries	**232**	**223**	

TABLE 4 *(continued)*

Source: Medicare National Claims History File.

Note: Sample includes those enrolled during the first four months of program operations. Participants were excluded from this table if they had an invalid HIC number on MPR's enrollment file, were identified as a member of the same household as a research sample member, or did not meet Medicare coverage and payer requirements (defined as having Medicare as a secondary payer, being in Medicare managed care plan, or not having Part A and Part B coverage) during the month of randomization. Patient-months were excluded if the participant did not meet the above Medicare coverage and payer requirements that month, or had died in a previous month.

"Percents with any medical encounter type" are the percent of treatment or control group members who have at least one encounter of a particular type; "mean numbers of medical encounter types" are the average number of encounters of a particular type per treatment or control group member.

[a]The direction of the treatment-control difference does not by itself signify whether the program is "effective." That is, for some outcomes a statistically significant negative difference (such as lower hospitalization rates for the treatment group than for the controls) suggests that the program is working as intended. However, a positive difference for other outcomes, such as number of physician visits, does not necessarily mean the program is ineffective or having adverse effects, because the program may encourage patients to see their physician more regularly for preventative care or to obtain recommended laboratory tests for their target conditions than they would have in the absence of the demonstration.

Due to rounding, the difference column may differ slightly from the result when the control column is subtracted from the treatment column.

[b]Includes visits to outpatient hospital facilities as well as emergency room visits that do not result in an inpatient admission. Laboratory and radiology services are also included.

[c]Includes diagnostic laboratory and radiology services (including pathologist and radiologist services) from nonhospital providers, suppliers and devices, mammography, ambulance, covered medications, blood, and vaccines.

[d]Does not include reimbursement for care coordination services provided by demonstration programs.

[e]Includes reimbursement for inpatient, skilled nursing facility, hospice, and all home health care (including that paid under Medicare Part B). Excludes reimbursement for care coordination services provided by demonstration programs.

[f]This is the average amount paid to the program as recorded in the Medicare claims data for the two months following randomization. The difference between the recorded amount and two time the amount the program was allowed to charge per-member-per-month may reflect billing errors, delays, or payment adjustments for patients who disenrolled.

*Difference between treatment and control groups significantly different from zero at the .10 level, two-tailed test.
**Difference between treatment and control groups significantly different from zero at the .05 level, two-tailed test.
***Difference between treatment and control groups significantly different from zero at the .01 level, two-tailed test.

TABLE 5

MONTHLY MEDICARE SERVICE USE FOR PARTICIPANTS WHO ENROLLED DURING THE FIRST SIX MONTHS OF PROGRAM OPERATIONS

	Group	Apr 02	May 02	Jun 02	Jul 02	Aug 02	Sep 02
Cumulative Enrollment Through Month End	Treatment	48	122	197	230	288	359
	Control	48	123	195	225	286	354
Mean Number of Beneficiaries Enrolled Who Meet Medicare Coverage and Payer Requirements and Are Alive That Month	Treatment	48	122	195	226	281	348
	Control	47	120	189	217	276	341
Average Medicare Reimbursement During the Month[a]	Treatment	$718	$1,586	$710	$1,417	$1,478	$1,131
	Control	$612	$1,273	$993	$742	$1,018	$566
Average Reimbursement for Care Coordination During the Month[a,b]	Treatment	$145	$116	$102	$71	$88	$87
Whether Admitted to Hospital This Month[a] (Percentage)	Treatment	4.2	8.2	3.1	8.4	7.5	6.9
	Control	2.1	10.8	7.4	4.6	5.8	3.8
Treatment - Control Difference[c]							
Average Medicare Reimbursement[a]		$106	$313	–$283	$676 *	$461	$565 ***
Average Reimbursement for Medicare plus Care Coordination[a]		$251	$429	–$180	$747 **	$549	$652 ***
Percentage Hospitalized[a]		2.0	–2.6	–4.3 *	3.8	1.7	3.1 *

Source: Medicare National Claims History File.

[a]Participants were excluded if they died in a previous month or failed to meet the Medicare coverage and payer requirements during the month of randomization or the month examined—that is, if they were in a Medicare managed care plan, had Medicare as a secondary payer, or did not have both Part A and Part B coverage. Participants were also excluded entirely from this table if they had an invalid HIC number on MPR's enrollment file.

[b]This is the average amount paid to the program as recorded in the Medicare claims data. The difference between the recorded amount and the program's approved per-member-per-month fee may reflect billing errors, delays, or payment adjustments for patients who disenrolled.

TABLE 5 *(continued)*

---

[c]The direction of the treatment-control difference does not by itself signify whether the program is "effective." That is, for some outcomes a statistically significant negative difference (such as lower hospitalization rates for the treatment group than for the controls) suggests that the program is working as intended. However, a positive difference for other outcomes, such as number of physician visits, does not necessarily mean the program is ineffective or having adverse effects, because the program may encourage patients to see their physician more regularly for preventative care or to obtain recommended laboratory tests for their target conditions than they would have in the absence of the demonstration.

*Difference between treatment and control groups significantly different from zero at the .10 level, two-tailed test.
**Difference between treatment and control groups significantly different from zero at the .05 level, two-tailed test.
***Difference between treatment and control groups significantly different from zero at the .01 level, two-tailed test.

is too small to draw reliable inferences about program effects. In four of the following five months, the treatment group incurs higher total Medicare costs than the control group. However, only one of these differences is statistically significant at the 1 percent level, and another one at the 10 percent level. During the first two months in the five-month period, a lower proportion of the treatment group than the control group was hospitalized, and a higher proportion in the remaining three months. Only two of these differences are statistically significant, and only at the 10 percent level.

It is too soon to tell whether these early treatment-control differences in Medicare costs will persist through the rest of the demonstration or whether they are due in part to s differences between the two groups in preenrollment costs and other characteristics (treatment group costs are significantly higher than control group costs in the year before enrollment). While care coordination programs may increase Medicare Part B costs early, as care managers uncover unmet needs for preventive diagnostic or other medical treatment, it does not seem likely that even an effective care coordination program would be able to affect Part A costs in the first few months after a patient enrolls. However, at $145 for the first month of care and $80 per patient per month thereafter, CenVaNet's MCCD has one of the lowest program payments in the MCCD. Thus, savings on Medicare services would not need to be as great for this program to achieve budget neutrality as they would for some of the others.

CONCLUSION

Research over the past decade suggests, but is by no means conclusive, that successful care coordination has many features. These include effective patient identification, a well-designed and structured intervention, highly qualified staff, physician buy-in, and financial incentives aligned with program goals.

First, to generate net savings over a relatively short period, effective programs tend to target high-risk people. These people may include those with recognized high-cost diagnoses such as heart failure, but also those with prevalent geriatric syndromes such as physical inactivity, falls, depression, incontinence, misuse of medications, and undernutrition (Rector and Venus 1999; and Fox 2000).

Second, successful programs tend to have a comprehensive, structured intervention that can be adapted to individual patient needs. Key features include a multifaceted assessment whose end product is a written care plan that can be used to monitor patient progress toward specific long- and short-term goals and that is updated and revised as the patient's condition changes; and a process for providing aggregate- and patient-level feedback to care coordinators, program leaders, and physicians about patient outcomes (Chen et al. 2000). Another critical aspect is patient education that combines the provision of factual information with techniques to help patients change self-care behavior and better manage their care, as well as addressing affective issues related to chronic illness (Williams 1999; Lorig et al. 1999; Vernarec 1999; Roter et al. 1998; and Aubry 2000). Finally, successful programs tend to have structures and procedures for integrating fragmented care and facilitating communication among providers, addressing the complexities posed by patients with several comorbid conditions, and, when necessary, arranging for community services (Chen et al. 2000; Bodenheimer 1999; and Hagland 2000).

The third and fourth characteristics that have been associated with successful programs are having highly trained staff and having actively involved providers. Strong programs typically have care coordinators who are baccalaureate-prepared nurses or who have case management or community nursing experience. They also tend to have the active support and involvement of patients' physicians (Chen et al. 2000; and Schore et al. 1999).

Finally, periodic feedback during the demonstration period can motivate providers and care coordinators and enable the program to modify or intensify the intervention if it appears that it is not having the expected effect on intermediate or ultimate outcome indicators. Financial incentives can encourage physicians and program staff to look for creative ways both to meet patient goals and reduce total health care costs (Schore et al. 1999).

Program Strengths and Unique Features. CenVaNet's MCCD program has many features associated with effective care coordination programs, plus some unique features.

- The program targets and enrolls patients with diagnoses typically associated with high health care costs. In addition, eligible patients must be at moderate to high risk for future health-related costs as determined by the PraPlus questionnaire. The program has succeeded in enrolling patients whose preenrollment Medicare expenditures are similar to those estimated in the demonstration's waiver application.
- Care managers conduct comprehensive assessments to identify patient needs. Care plans are individualized to each patient and are updated as patient needs change. The highest-acuity patients receive weekly or more frequent monitoring, high-acuity patients receive weekly or biweekly monitoring, moderate-acuity patients receive biweekly or monthly monitoring, and low-acuity patients receive monthly monitoring. Patient monitoring contacts take place by telephone or in person at patients' homes.
- InformaCare, the program's care management information system, links assessment, care planning, and monitoring with patient education to streamline the care management process. When the care managers input assessment data into InformaCare, it automatically generates a care plan template, reminds care managers when patient monitoring contacts are due, and suggests patient education materials related to the patient's care plan goals.
- The program uses InformaCare to generate reports that the care managers and program leaders use to monitor patient and program progress. The program has begun to collect data on patient's clinical and behavioral outcomes but does not plan to share these data with physicians.
- Patient education combines disease-specific written guidelines with visual aids and outside education resources to target patients' individual learning needs. Care managers monitor whether patients are incorporating their learning into daily activities and will modify patients' goals if they do not appear to understand the information presented.
- The program facilitates communication between patients and physicians by providing patients with tools to monitor their own care and report information to their

physicians, while empowering patients to ask for the care they need. Care managers integrate fragmented care by resolving polypharmacy issues and help patients to overcome barriers to care by arranging for community-based services. The program strongly encourages patients to become advocates for their own care needs.

- Care managers are either registered nurses or clinical social workers with significant community-based experience. The social worker care managers and nurse care managers co-manage patients with significant psychosocial needs, difficult family situations, or needs for assistance from federal entitlement or other social service benefit programs.

- The program gained physician support before the demonstration began by visiting offices and explaining the program to physicians and office administrators. This support helped the program to identify and enroll its target patient population. After patients enroll, the program places few burdens on physicians' time. Care managers understand when they should appropriately ask the physicians to become involved in the care coordination process.

Potential Barriers to Program Success. The design of CenVaNet's MCCD program contains no obvious barriers to success, although a few issues bear continued observation. One possible barrier to the program's success is that, because the program requires minimal physician involvement, care managers have little opportunity to build relationships with patients' physicians and involve them in the care coordination process. Without these relationships, physicians may not trust the care managers' recommendations, call on them as a resource to help their patients, or tell them about changes in patients' status or medical regimens. However, the program has taken this approach to physicians because they believe they cannot realistically expect physicians to actively participate in a fee-for-service care coordination program. Given the program's approach of teaching patients to manage their own care (including initiating contact with their physicians when problems arise) and of developing relationships with physicians' office staff as communications conduits to physicians, the program's minimal direct contact between physicians and care managers may not be a problem. Indeed, CenVaNet's care coordination model may provide a useful comparison to other demonstration programs that expect a higher degree of physician involvement.

Another issue is the lack of timely information alerting care managers to patient hospitalizations or emergency room visits because the program relies entirely on patient self-reports of such events. Although the program staff do not believe that relying on patient and family self-reports of adverse events is problematic, this approach reduces the care managers' opportunity to quickly determine if patients understand their discharge instructions or to review any new medications that have been prescribed. Timeliness is important since, if care managers are able to clarify instructions and review new medications patients receive from hospital staff immediately after such events, they are more likely to be able to help patients reduce the need for further hospital or emergency room use.

It remains to be seen whether the CenVaNet MCCD model of care coordination can reduce hospitalizations and other avoidable expenses despite these potential shortcomings. The data available for this report covered a time period too early to be indicative of its eventual effectiveness. However, the program is enrolling patients with serious health problems and high health care costs, and the cost of its intervention is relatively low. Thus, it would only need to make modest improvements in patient health and modest proportional reductions in Medicare costs to meet demonstration budget neutrality goals.

Plans for the Second Site-Specific Report. A second report will be prepared on CenVaNet's MCCD program activities during the second and third years of operation. That report will focus more heavily on program impacts based on survey and claims data. It will also describe changes made to the program over time and the reasons for those changes, as well as staff impressions of program successes and shortcomings. The report is due in mid-2005.

REFERENCES

Archibald, Nancy, and Jennifer Schore. "The Early Experience of the CenVaNet Case Management Program." Princeton, NJ: Mathematica Policy Research, Inc., August 2003.

Aubry, Barbara. "Bolstering Disease Management Programs." *Healthplan*, July-August 2000, pp. 11-12.

Bodenheimer, Thomas. "Disease Management—Promises and Pitfalls." *New England Journal of Medicine*, vol. 340, no. 15, April 15, 1999, pp. 1202-1205.

Chen, Arnold, Randall Brown, Nancy Archibald, Sherry Aliotta, and Peter Fox. "Best Practices in Coordinated Care." Princeton, NJ: Mathematica Policy Research, Inc., February 29, 2000.

Fox, Peter. "Screening: The Key to Early Intervention for High-Risk Seniors." *Healthplan*, November-December 2000, pp. 56-61.

Hagland, Mark. "Integrating Disease Management." *Healthplan*, January-February 2000, pp. 43-46.

Lorig, Kate, David Sobel, Anita Stewart, et al. "Evidence Suggesting that a Chronic Disease Self-Management Program Can Improve Health Status While Reducing Hospitalization." *Medical Care*, vol. 37, no. 1, 1999, pp. 5-14.

Pacala, J.T., C. Boult, R.L. Reed, and E. Aliberti. "Predictive Validity of the Pra Instrument Among Older Recipients of Managed Care." *Journal of the American Geriatrics Society*, vol. 45, 1997, pp. 614-617.

Rector, Thomas, and Patricia Venus. "Judging the Value of Population-Based Disease Management." *Inquiry*, vol. 36, summer 1999, pp. 122-126.

Roter, Debra, Judith Hall, Rolande Merisca, et al. "Effectiveness of Interventions to Improve Patient Compliance." *Medical Care*, vol. 36, no. 8, 1998, pp. 1138-1161.

Schore, Jennifer, Randall Brown, and Valerie Cheh. "Case Management for High-Cost Medicare Beneficiaries." *Health Care Financing Review*, vol. 20, no. 4, summer 1999, pp. 87-102.

Vernarec, Emil. "Health Care Power Shifts to the People." *Business and Health: The State of Health Care in America 1999*, pp. 8-13.

Williams, Mark. "Chronic Care Clinics: Why Don't They Work?" *Journal of the American Geriatrics Society*, vol. 47, no. 7, July 1999, pp. 908-909.

APPENDIX A

ADDITIONAL TABLES

TABLE A.1

DEMONSTRATION PROGRAMS PARTICIPATING IN THE EVALUATION

Host Organization	Organization Type	Service Area	Targeted Diagnoses
Avera Research Institute/Avera McKennan Hospital and University Health Center	Hospital	49 counties in South Dakota and 22 contiguous counties in Minnesota, Nebraska, and Iowa	CHF
Carle Foundation	Integrated delivery system	11 counties in east central Illinois and 2 counties in west central Indiana	Heart conditions Diabetes Chronic lung disease
CenVaNet	Provider of care coordination services owned by hospitals and physicians	Richmond, Virginia, metropolitan area	Heart conditions Diabetes Chronic lung disease Cerebrovascular disease
Charlestown Retirement Community	Part of Erickson Retirement Communities	2 retirement communities in the Baltimore, Maryland, metropolitan area[a]	Heart conditions Diabetes COPD
CorSolutions	Provider of disease management services	Harris, Fort Bend, Bruzoria, and Montgomery counties, Texas (Houston area)	CHF
Georgetown University Medical School	Academic institution in partnership with Medstar, owner of Georgetown University Hospital and Washington Hospital Center	Washington, DC, and parts of Maryland and Virginia	CHF
Health Quality Partners	Provider of quality improvement services	Four counties in eastern Pennsylvania	Heart conditions Diabetes Asthma Moderate to severe hyperlipidemia or hypertension
Hospice of the Valley	Hospice	Maricopa County, Arizona (greater Phoenix)	CHF COPD Cancer Neurological conditions

TABLE A.1 *(continued)*

Host Organization	Organization Type	Service Area	Targeted Diagnoses
Jewish Home and Hospital Lifecare System	Long-term care provider, in partnership with the medical practices of St. Luke's and Mt. Sinai hospitals as referral sources	Manhattan and the Bronx, New York City	Heart conditions Diabetes Chronic lung disease Cancer Liver disease Stroke or other cerebrovascular disease Psychotic disorder Major depressive or anxiety disorder Alzheimer's or other cognitive impairment
Lovelace Health Systems	Integrated delivery system	Albuquerque metropolitan statistical area (Bernalillo, Valencia, and Sandoval counties in New Mexico)	CHF Diabetes
Medical Care Development	Consortium of 17 Maine hospitals hosted by a health services research organization	Rural areas of Maine	Heart conditions
Mercy Medical Center/North Iowa	Hospital	Rural areas of Iowa	CHF Chronic lung disease Liver disease Stroke Vascular disease Renal failure
QMed	Provider of disease management services	2 counties in northern California	CAD
Quality Oncology, Inc.	Provider of disease management services	Broward and Dade counties, Florida	Cancer
University of Maryland Medical School	Academic institution	Baltimore, Maryland, metropolitan area, two counties in western Maryland, four in eastern Maryland, and two in Pennsylvania	CHF
Washington University School of Medicine	Academic institution in partnership with American Healthways, a disease management services provider	St. Louis, Missouri, metropolitan area	No specific diagnoses targeted[b]

TABLE A.1 *(continued)*

Note: Each program's service area and targeted diagnoses refer to its first year of operations.

Heart conditions may include congestive heart failure (CHF); coronary artery disease (CAD); atrial fibrillation; and ischemic, hypertensive, or other heart diseases. Chronic lung disease includes asthma and chronic obstructive pulmonary disease (COPD). Neurological conditions include stroke, Alzheimer's disease, Parkinson's disease, and amyotrophic lateral sclerosis.

[a]Charlestown added a third retirement community in April 2003.

[b]Washington University uses an algorithm developed by its demonstration partner, American Healthways, to target Medicare beneficiaries who are likely to become clinically unstable and to require hospitalization during the next 12 months.

TABLE A.2

LIST OF DOCUMENTS REVIEWED FOR THIS REPORT

CenVaNet Community-Based Case Management Demonstration for Chronically Ill Medicare Beneficiaries (proposal submitted to the Health Care Financing Administration, October 2000)

Telephone interview script*

PraPlus screening questionnaire

Informed consent form*

Assessment profile*

Self-management assessment*

Initial contact questionnaire—diabetes*

Care manager feedback report*

Patient care plan and agreement—diabetes management*

Acuity level rating table*

Job descriptions

Organizational chart

CCM orientation checklist*

Reports generated at the program level
- Administrative aggregate report—diabetes 12/1/02-12/31/02*
- Administrative aggregate report—CVD 12/1/02-12/31/02*
- Enrollment status reports—6/26/02, 1/22/03, 3/18/03

Care management satisfaction survey (patient)*

Sample letter to physicians with clinical report*

Physician information (physician marketing materials)*

CenVaNet Health News (patient newsletter)*

Patient education handbooks: diabetes, congestive heart failure, pulmonary care management (COPD)

Standard of Care Card—diabetes*

* Included in Appendix C of this report.

APPENDIX B

METHODS USED TO ANALYZE PARTICIPATION AND PROGRAM IMPACTS

This appendix describes the methods and data sources used to analyze participation and treatment-control service use and reimbursement differences using Medicare data.

A. METHOD FOR CALCULATING PARTICIPATION RATE AND PATTERNS

The proportion and types of beneficiaries the program attracted were measured by calculating the participation rate and patterns. The participation rate was calculated as the number of beneficiaries who met the program's eligibility criteria and actually participated during the first six months of the program's operations divided by the number who met the eligibility criteria. The six-month window spanned 179 days, from April 8, 2002, through October 4, 2002. Patterns of participation were explored by comparing eligible participants and eligible nonparticipants, noting how they differed on demographics, reason for Medicare eligibility, and costs and use of key Medicare services during the previous two years.

1. Approximating Program Eligibility Criteria

First, the program's eligibility criteria, reflecting CMS's insurance coverage and payer criteria for all programs and CenVaNet's specific criteria, were identified. CMS excluded beneficiaries from the demonstration who were not at risk for incurring full costs in the fee-for-service setting because they (1) were enrolled in a Medicare managed care plan, (2) did not have both Part A and B coverage, or (3) did not have Medicare as the primary payer.

In addition to CMS's requirements, CenVaNet applied program-specific criteria to identify the target population. Table B.1 summarizes these criteria, which were approved by CMS and by the Office of Management and Budget (Brown et al. 2001). The program confirmed these criteria in spring 2003. To be included in the program's demonstration, beneficiaries must have been seen by a health care provider in the previous year for one of the following conditions: ischemic heart disease, hypertensive heart disease, congestive heart failure, chronic obstructive

pulmonary disease and related diseases, cerebrovascular disease, cardiovascular disease, or diabetes. In addition, CenVaNet required that beneficiaries receive a score of moderate or high on the PraPlus survey instrument, which assesses the probability of hospital admission, to exclude patients for whom the program's intervention would have little impact. Along with meeting the inclusion criteria, at the time of enrollment beneficiaries could not (1) have HIV, (2) be an organ transplant candidate, (3) have major mental disorders such as schizophrenia or affective disorders, (4) have end-stage renal disease requiring dialysis, (5) be younger than age 65, (6) be unable to sign or have a caregiver sign informed consent, or (7) be currently enrolled in a CenVaNet care management program.

TABLE B.1
ELIGIBILITY CRITERIA

Inclusion Criteria	Patients seen in the previous year for ischemic heart disease (ICD-9 codes 410-414.9), hypertensive heart disease (402.XX), CHF (428.XX), COPD and related diseases (491-496), cerebrovascular disease (430-438.9), cardiovascular disease (429.2, 429.9), diabetes (250). Also, patients must have a score of moderate or high on the PraPlus survey instrument.
Exclusion Criteria	Meets any of the six criteria: 1. HIV 2. Transplant candidate 3. Major mental disorders (schizophrenia, affective disorders) 4. Dialysis patient 5. Under 65 6. Unable to sign or have caregiver to sign informed consent 7. Enrolled in a CenVaNet care management program ICD codes V08, 042, 295-298.9, V46.1, v56.XX
Providers/Referral Sources	CenVaNet physicians
Geographic Location	The City of Richmond and the Counties of Henrico, Hanover, and Chesterfield in Virginia

To identify whether a beneficiary met the program's medical exclusion criteria or had treatment for one of the program's target diagnoses on any claim, an 18-month period was examined,

beginning on May 1, 2001, one year before the program began, and ending on October 31, 2002, six months after the program began. Three criteria could not be fully approximated using Medicare data. First, inclusion criteria could not be restricted to "high-risk" beneficiaries—those who received a score of moderate or high on the PraPlus survey instrument. Second, eligible beneficiaries were not limited to people who had used specific doctors who refer patients to the program, making the estimates overstate the true number of people CenVaNet would have approached about participating. Third, two of CenVaNet's exclusion criteria could not be fully approximated using Medicare data. These criteria were (1) being unable to sign or have a caregiver give informed consent, and (2) identifying whether they were enrolled in a CenVaNet care management program. As a result, our estimates of the number of eligible nonparticipants overestimate the number of people who are actually eligible for CenVaNet's program.

2. Identifying Health Insurance Claim (HIC) Numbers and Records of Participants and All Beneficiaries

Medicare claims and eligibility data and data the program submitted were used to identify participants and eligible nonparticipants. For all participants, the Medicare enrollment database (EDB) file was used to confirm the HIC numbers, name, and date of birth submitted by the program when beneficiaries were randomized. Potentially eligible nonparticipants were found by identifying the HIC numbers of all Medicare beneficiaries who were alive and living in the catchment counties during the six-month enrollment window. Initially, three years of Denominator records (1999-2001) and one year of HISKEW records (2002) were used to identify people living in the catchment counties at any time in the 1999-2002 period. HIC numbers of potentially eligible nonparticipants and all participants together formed a finder file. The finder file was used to gather data on the beneficiary's state and county of residence during the six-month enrollment period, as well as to obtain information from the EDB. Using this

information, the sample was limited to people living in the catchment counties at any point during the six-month enrollment window. This finder file was also used to make a cross-reference file to ensure that all possible HIC numbers the beneficiary may have been assigned were obtained. This was done using Leg 1 of CMS's Decision Support Access Facility. At the end of this step, a list of HIC numbers existed for all participants, as well as for all beneficiaries living in the catchment area during the six-month enrollment period.

3. Creating Variables from Enrollment and Claims Data

Eligibility information was obtained from the EDB and diagnostic and utilization data from the National Claims History (NCH) file. All claims files were accessed through CMS's Data Extract System. At the end of February 2003, we requested Medicare claims from 1999 through 2002. We received all claims that were updated by CMS through December 2002. This allowed a minimum of a two-month lag between a patient's receipt of a Medicare-covered service in the last month examined—October 2002—and the appearance of the claim on the Medicare files.[1]

Medicare claims and eligibility information were summarized as monthly variables from May 2001 through October 2002, for a total of 18 months. This enabled us to look at the eligibility status and the use of Medicare-covered services during any month in the two years before the program's start, to analyze participation in the first six months of program operation, and to analyze treatment-control differences in Medicare service use and reimbursement following enrollment.

[1]Occasionally, the HIC number in the cross-reference file was not in the EDB file used. Because data from the EDB were needed for the analyses, such beneficiaries were dropped from the sample. One reason for differences between the HIC numbers in the EDB and cross-reference files was that the two files were updated at different times. CMS created the cross-reference file using the unloaded version of the EDB, which was updated quarterly. Data were extracted using the production version of the EDB, which was updated every night.

The EDB file provided the information with which to construct measures of beneficiaries' demographic characteristics (age, sex, race), dates of death, original reason for Medicare entitlement, Medicare managed care enrollment, Part A and B coverage, whether Medicare was the primary payer, and the state buy-in proxy measure for enrollment in Medicaid.

The Medicare claims data in the NCH files were used to construct measures of Medicare-covered service use and reimbursement by type of service (inpatient hospital, skilled nursing facility, home health, hospice, outpatient hospital, and physician and other Part B providers). When the services spanned months, the monthly variables were allocated based on the number of days served in that month as documented in the CLAIM FROM and CLAIM THRU dates. The length of stay for a month represented actual days spent in the facility in that month; costs were prorated according to the share of days spent in each month. Ambulatory visits were defined as the unique counts of the person-provider-date, as documented in the physician/supplier and hospital outpatient claims. Durable medical equipment reimbursements were counted in other Part B reimbursements. A small number of negative values for total Part A and Part B reimbursements during the past two years occurred for some of the demonstration programs. Any negative Part A and Part B amounts were truncated to zero. The few patients with a different number of months in Part A and Part B were dropped from the analysis of reimbursement in the two years before intake.

When beneficiary's history was examined from the month during which the beneficiary was randomized, the actual date of randomization was used for participants and a simulated date of randomization for nonparticipants, picked to be July 15, 2002, or roughly the midpoint of the six-month enrollment window.

4. Defining Eligible Nonparticipants and Eligible Participants

Target criteria information was used to whittle the group of beneficiaries who lived in the catchment area down to those who met the program's eligibility criteria, which could be measured using the Medicare data. Tables B.2 and B.3 illustrate the exclusions used to identify the sample of eligible participants and nonparticipants used to analyze participation patterns.

We identified 103,120 beneficiaries who lived in CenVaNet's catchment area at some point during the first six months of enrollment (Table B.2). We then excluded 10,702 people (10.4 percent) who did not meet the insurance requirements set by CMS for participation in the program during one or more months during the six-month enrollment window. Another 42,903 of the remaining beneficiaries (41.6 of all area beneficiaries) were dropped from the sample, since they did not have one or more of the target diagnoses the program identified as necessary for inclusion on any claim during the 18 months from May 2001 through October 2002 (which includes the year before the program began, as well as the six-month enrollment window). Finally, 10,068 people were identified as having at least one of CenVaNet's exclusion criteria in that same 18-month period, leaving 39,447 beneficiaries (38 percent of all beneficiaries) in the catchment area we estimated would have been eligible to participate in CenVaNet's program.

CenVaNet randomized 784 beneficiaries who enrolled in the demonstration program during the first six months of operation (Table B.3). Of these, 11 people (about 1 percent) could not be matched to their Medicare claims data due to problems with their reported HIC numbers and were therefore excluded from the participation sample.[2] CenVaNet randomized 11 beneficiaries

[2]This number includes both beneficiaries with invalid HIC numbers reported and those whose claims we could not obtain when we extracted the files due to the way the Medicare files are created (described in footnote 1). Those with incorrect HIC numbers may well be eligible, but we could not obtain the Medicare data for them to assess that, so they were excluded. HIC numbers have since been corrected and those beneficiaries will be included in the final report.

TABLE B.2

SAMPLE OF ALL ELIGIBLE BENEFICIARIES FOR PARTICIPATION ANALYSIS

Sample	Number
Full Sample of Eligible Beneficiaries Who Live in Catchment Area One or More Months During the First Six Months of Enrollment	103,120
Minus those who:	
During 6-month enrollment period, either (1) were always in a Medicare managed care plan, or (2) never had Medicare Part A coverage, or (3) never had Medicare Part B coverage, or (4) Medicare was not primary payer during one or more months	–10,702
Did not have one or more of the target diagnoses on any claim during the 18 months from May 2001 through October 2002	–42,903
Met at least one of the exclusion criteria during the 18 months from May 2001 through October 2002	–10,068
Eligible Sample	**39,447**

TABLE B.3

SAMPLE OF ELIGIBLE PARTICIPANTS FOR PARTICIPATION ANALYSIS

Sample	Treatment Group	Control Group	All
Full Sample of Participants Randomized During the First Six Months of Enrollment	395	389	784
Minus those who:			
Had an invalid HIC number on MPR's enrollment file	–4	–7	–11
Not in geographic catchment area during the month of intake	–5	–6	–11
In a Medicare managed care plan, or did not have Medicare Part A and B coverage, or Medicare is not primary payer during the month of intake	–2	–6	–8
Did not have one or more of the target diagnoses on any claim during the 18 months from May 2001 through October 2002	–1	–6	–7
Met at least one of the exclusion criteria during the 18 months from May 2001 through October 2002	–28	–17	–45
Eligible Sample	**355**	**347**	**702**

Note: The number of sample members reported as excluded at each point reflects *people in the previous line* who did not meet the additional eligibility criteria according to Medicare data. Thus, the table applied sequential criteria. The program actually used patient self-reports of diagnosis and service use. The total number of people who failed to meet a particular exclusion criterion may have been greater than the number reported in this table for program criteria that we could not fully assess using claims data (for example, reading level).

who had an address on the EDB that was outside its county catchment area. These cases were excluded from the participation analysis to maintain comparability to the eligible nonparticipants sample. Also excluded were eight participants who did not meet CMS's requirements for participation in the program during the month of intake. In addition, seven beneficiaries were dropped for not having at least one claim for a target diagnosis during the 18-month period from May 2001 through October 2002. The largest share (six percent), or 45 participants, were dropped from the participation analysis because the participants met one of the program's exclusion criteria. Thus, among the 784 participants randomized by CenVaNet into the program during its first six months of operations, after exclusions, 702 people were included in the participation analyses as eligible participants.

CenVaNet's participation rate for the first six months of enrollment is therefore calculated as the number of participants who met the eligibility requirements (702), divided by the number of eligibles who live in the catchment area (39,447), or 1.8 percent.

Table B.4 describes the characteristics of the 702 participants enrolled by CenVaNet during the first six months and who appear to meet CenVaNet's eligibility requirements, as measured in Medicare data, and the 38,745 eligible nonparticipants. This table is identical to Table 2 in the text, except that the participant sample has been restricted to the beneficiaries who meet the eligibility criteria according to Medicare claims data. Because more than 90 percent of the

TABLE B.4

CHARACTERISTICS OF ELIGIBLE PARTICIPANTS AND ELIGIBLE NONPARTICIPANTS DURING THE FIRST SIX MONTHS OF PROGRAM ENROLLMENT
(Percentages, Unless Otherwise Noted)

	Eligible Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants
Age at Intake		
Average age (in years)	77.1	76.3***
Younger than 65	0.0	0.0
65 to 74	36.9	44.7***
75 to 84	49.9	41.1***
85 or older	13.3	14.2
Male	54.0	39.9***
Nonwhite	16.1	23.6***
Original Reason for Medicare: Disabled or ESRD	7.3	6.6
State Buy-In for Medicare Part A or B	6.4	10.1***
Newly Eligible for Medicare (Eligible Less than Six Months)	0.00	0.00
Enrolled in Fee-for-Service Medicare 6 or More Months During Two Years Before Intake	99.9	99.8
Medical Conditions Treated During Two Years Before Month of Intake[b]		
Coronary artery disease	75.3	42.3***
Congestive heart failure	64.9	21.9***
Stroke	33.1	25.8***
Diabetes	46.4	38.0***
Cancer	25.7	21.0***
Chronic obstructive pulmonary disease	47.5	32.5***
Dementia (including Alzheimer's disease)	2.1	4.0**
Peripheral vascular disease	20.5	12.2***
Renal disease	10.4	4.9***
Total Number of Diagnoses	3.3	2.0***
Days Between Last Hospital Admission and Intake Date[b]		
No hospitalization in past two years	35.4	61.0***
0 to 30	4.4	3.3*
31 to 60	5.1	2.9***
61 to 180	17.7	9.7***
181 to 365	19.8	10.1***
366 to 730	17.6	13.2***

TABLE B.4 *(continued)*

	Eligible Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants
Annualized Number of Hospitalizations During Two Years Before Month of Intake[b,c]		
0	35.7	61.4***
0.1 to 1.0	40.4	29.2***
1.1 to 2.0	14.7	7.0***
2.1 to 3.0	5.3	1.7***
3.1 or more	4.0	0.8***
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]		
Part A	$649	$280***
Part B	$386	$228***
Total	$1,035	$507***
Distribution of Total Medicare Reimbursement per Month Fee-for-Service During One Year Before Intake[b]		
$0	0.4	0.9
$1 to 500	51.9	75.0***
$501 to 1,000	14.8	9.9***
$1,001 to 2,000	15.7	7.7***
More than $2,000	17.1	6.5***
Number of Beneficiaries	**702**	**38,745**

Source: Medicare Enrollment Database and National Claims History File.

Note: The intake date used in this table is the date of enrollment for participants. For eligible nonparticipants, the intake date is July 15, 2002, the midpoint of the six-month enrollment period examined.

[a]Participants who do not meet CMS's demonstration-wide requirements for the demonstration, or who had an invalid HIC number on MPR's enrollment file, are excluded from this table because we do not have Medicare data showing their reimbursement in the fee-for-service program. Members of the same households as the research sample members are included.

[b]Calculated among beneficiaries with six or more months in Medicare fee-for-service in the two years before intake. (See Note, above, concerning intake date definition.)

[c]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). For example, if a beneficiary was in fee-for-service all 24 months and had two hospitalizations during that time, they would have one hospitalization per year [(12 x 2) / 24]. If another beneficiary was in fee-for-service eight months during the previous two years, and had two hospitalizations during those eight months, they would have [(12 x 2) / 8], or three hospitalizations per year. The estimate of the proportion with no hospitalization in the two years before the month of intake may differ slightly from the proportion with no hospitalization in the two years before the date of intake because the two measure slightly different periods. Someone enrolled on September 20, 2003, whose only hospitalization in the preenrollment period occurred on September 5, 2003, would not be counted as hospitalized during the 24 months before the month of intake. Conversely, someone hospitalized on September 25, 2001 would be captured in the measure defined by month of enrollment but not in the measure based on the day of enrollment.

*Difference between eligible participants and eligible nonparticipants significantly different from zero at the .10 level, two-tailed test.

**Difference between eligible participants and eligible nonparticipants significantly different from zero at the .05 level, two-tailed test.

***Difference between eligible participants and eligible nonparticipants significantly different from zero at the .01 level, two-tailed test.

participants are included in this table, the results are similar to those in Table 2.[3]

B. METHOD FOR CALCULATING TREATMENT-CONTROL DIFFERENCES

Sample sizes are too small, and the follow-up period too short, to estimate program impacts. Comparing the treatment and control groups on mean outcomes, however, provides an early indication of potential effects. The analysis draws on the data and the variables constructed for the participation analysis but is restricted to the program's participants (treatments and controls). The cost of the intervention was estimated as the amount CMS paid to CenVaNet for the treatment group patients, using G-coded claims in the physician claims file.

1. Treatment-Control Differences

Two approaches were used to estimate treatment-control differences in Medicare-covered service use and cost outcomes. First, differences were estimated over a two-month follow-up period for all people CenVaNet randomized during the first four months of enrollment. The four-month enrollment window covers April 8, 2002, through August 5, 2002. The follow-up time covered the two calendar months after the month of randomization. For example, for a beneficiary randomized on May 25, outcomes were examined in June and July.

[3] Nonparticipants were identified as eligible if they met the target criteria at any time during the six-month enrollment window, as well as the year before the window. When we calculated preenrollment use of Medicare services for nonparticipants, we measured use over the time before a pseudo-enrollment date fixed at three months after the program began enrollment (that is, the middle of the six-month window). As a result, for nonparticipants who became eligible based on service use in the latter three months of the six-month enrollment window, this method does not capture that service use. We tested the sensitivity of the findings to this approach. For the sensitivity test, we limited the eligible nonparticipants to those who met the diagnostic and service use criteria before their pseudo-enrollment date. This subsample of eligible nonparticipants had slightly higher reimbursements and service use than the sample shown in Tables 2 and B.4. For most programs, reimbursements for the eligible nonparticipants increased between 2 and 10 percent, and hospitalizations stayed the same or increased up to 10 percent.

Second, treatment-control differences were estimated by calendar month over the first six months of CenVaNet's enrollment to look at how cost-effectiveness might vary over the life of a program. One might expect programs to have little effect at first, since it takes time for patients to be assessed, the program to become fully functional, the patients to adopt care managers' recommendations, and these behavior changes to affect the need for health care. Analyzing costs by program month will allow us to examine such patterns. For each month from April 2002 through September 2002, we identified the patients who were enrolled in CenVaNet's coordinated care program and analyzed their Medicare-covered service use. For example, a person randomized in April would be present in April through September, provided that person was eligible and alive in each month.[4] Someone randomized in May would not be part of the calculations for April but would be included in May through September, again provided that the person was eligible during those months.

The sample used to analyze treatment-control differences in outcomes differs from that used to analyze participation. Like the participation analyses, we excluded from the analysis sample randomized individuals for whom we have an invalid HIC number, because we could not obtain their Medicare claims data. We also excluded those people who enrolled but were ineligible for the demonstration according to CMS's insurance criteria (as determined from data on the EDB). However, beneficiaries flagged as a household member of a participant also were excluded, since they were not part of the research sample and thus were not used for the outcomes analysis.[5] In addition, in contrast to the participation analyses, participants who did not meet the program's

[4] Patients were excluded as ineligible during months when we could not observe their full costs (when they were enrolled in a Medicare managed care plan for the full month).

[5]Household members enrolled in this study were excluded from treatment-control comparisons to keep the two groups balanced. Beneficiaries who enrolled in the study residing

target criteria according to the claims and EDB data were not excluded from the outcomes analyses. Given this, of the 492 people randomized in the first four months of CenVaNet's demonstration, the sample for analyzing treatment-control differences contained 455 people. For the six-month sample, 725, or 92 percent of the 784 randomized people, were included in the final sample (Table B.5). In addition to excluding beneficiaries, we excluded months during which we could not observe the beneficiaries' full costs in fee-for-service (described in footnote 4).

2. Integrity of Random Assignment

Eligible applicants to the program were randomly assigned to the treatment or control group. To assess whether random assignment successfully produced treatment and control groups with similar baseline characteristics, two-tailed t-tests and chi-squared tests were used to compare the two research groups. Table B.6 presents the baseline characteristics for the four- and six-month samples.

As expected under random assignment, the treatment and control groups had similar characteristics in both the four- and six-month samples. There were statistically significant treatment-control differences in six baseline characteristics for the four-month sample: (1) the proportion of beneficiaries who are male; (2) the proportion of beneficiaries whose days between last hospital discharge and intake was between 31 and 60; (3) the proportion of beneficiaries who

(continued)
in the same household as a previously enrolled beneficiary, "household members," were assigned to the same experimental status as the already enrolled beneficiary to avoid the contamination that might occur if one person in the household was in the treatment group and another was in the control group. As a result, we expected to find fewer household members in the control group than in the treatment group, since household members have less incentive to join the demonstration if they know a household member has already been assigned to the control group and they will not receive care coordination.

TABLE B.5

SAMPLES FOR TREATMENT-CONTROL COMPARISONS

	First Four Months	First Six Months
Number of beneficiaries who were randomized	492	784
Minus those who:		
Were members of the same household as research sample members	–26	–39
Had invalid HIC numbers on MPR's enrollment file	–6	–11
In a Medicare managed care plan, or did not have Medicare Part A and B coverage, or Medicare is not primary payer during the month of intake	–5	–9
Number of usable sample members	**455**	**725**

TABLE B.6

CHARACTERISTICS OF TREATMENT AND CONTROL GROUPS
IN THE RESEARCH SAMPLE ENROLLED DURING
THE FIRST FOUR MONTHS AND SIX MONTHS
OF PROGRAM ENROLLMENT

	Four-Month Sample			Six-Month Sample		
	Treatment Group	Control Group	Total Research Sample	Treatment Group	Control Group	Total Research Sample
Age at Intake						
Average age (in years)	76.7	77.3	77.0	76.7	77.2	76.9
Younger than 65	0.0	0.0	0.0	0.0	0.0	0.0
65 to 74	38.4	39.5	38.9	38.7	37.2	37.9
75 to 84	50.0	45.7	47.9	49.1	48.9	49.0
85 or older	11.6	14.8	13.2	12.3	14.0	13.1
Male	44.4	53.8**	49.0	50.4	57.0*	53.7
Nonwhite	15.5	14.8	15.2	16.6	16.2	16.4
Original Reason for Medicare: Disabled or ESRD	9.1	10.8	9.9	7.9	8.7	8.3
State Buy-In for Medicare Part A or B	9.1	5.8	7.5	7.9	6.4	7.2
Newly Eligible for Medicare (Eligible Less than Six Months)	0.0	0.0	0.0	0.0	0.0	0.0
Enrolled in Fee-for-Service Medicare Six or More Months During Two Years Before Intake	99.6	100.0	99.8	99.7	100.0	99.9
Medical Conditions Treated During Two Years Before Month of Intake[a]						
Coronary artery disease	74.0	70.4	72.2	76.0	74.0	75.0
Congestive heart failure	81.8	77.6	79.7	67.2	64.0	65.6
Stroke	38.5	39.5	39.0	32.5	36.6	34.5
Diabetes	41.1	38.1	39.6	46.5	46.9	46.7
Cancer	34.2	19.7***	27.1	28.4	23.5	26.0
Chronic obstructive pulmonary disease	59.7	55.6	57.7	50.8	46.7	48.8
Dementia (including Alzheimer's disease)	4.8	2.7	3.7	3.0	2.2	2.6
Peripheral vascular disease	24.7	19.7	22.2	23.5	18.4*	21.0
Renal disease	10.8	12.6	11.7	9.0	11.7	10.4
Total Number of Diagnoses (number)	3.7	3.4**	3.5	3.4	3.2	3.3

TABLE B.6 *(continued)*

	Four-Month Sample			Six-Month Sample		
	Treatment Group	Control Group	Total Research Sample	Treatment Group	Control Group	Total Research Sample
Days Between Last Hospital Admission and Intake Date[a]						
No hospitalization in past two years	25.5	25.6	25.6	36.1	31.8	34.0
0 to 30	4.8	5.4	5.1	5.2	3.6	4.4
31 to 60	8.7	4.0**	6.4	6.0	3.4*	4.7
61 to 180	22.5	22.0	22.2	16.9	20.4	18.6
181 to 365	24.2	23.3	23.8	19.7	22.1	20.9
366 to 730	14.3	19.7	17.0	16.1	18.7	17.4
Annualized Number of Hospitalizations During Two Years Before Month of Intake[a,b]						
0	25.5	26.5	26.0	36.6	31.8	34.3
0.1 to 1.0	37.7	44.8	41.2	35.0	43.0**	39.0
1.1 to 2.0	21.2	16.1	18.7	17.5	14.3	15.9
2.1 to 3.0	7.8	7.2	7.5	5.5	7.0	6.2
3.1 or more	7.8	5.4	6.6	5.5	3.9	4.7
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[a]						
Part A	$1,072	$799**	$938	$811	$644*	$729
Part B	$522	$412***	$468	$435	$372**	$404
Total	$1,594	$1,211**	$1,406	$1,246	$1,016*	$1,132
Distribution of Total Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[a]						
$0	0.4	0.0	0.2	0.8	0.3	0.6
$1 to 500	38.5	44.4	41.4	50.3	50.3	50.3
$501 to 1,000	13.4	20.2*	16.7	12.0	18.2**	15.1
$1,001 to 2,000	17.3	13.9	15.6	15.0	14.8	14.9
More than $2,000	30.3	21.5**	26.0	21.9	16.5*	19.2
Location During Program Intake Period						
Virginia						
Chesterfield	15.5	15.7	15.6	14.2	15.1	14.6
Hanover	11.6	17.0	14.3	11.4	13.7	12.6
Henrico	41.8	37.2	39.6	37.6	38.0	37.8
Richmond	31.0	30.0	30.5	36.5	32.7	34.6
Outside catchment area	0.9	1.4	1.1	1.1	1.4	1.2
Number of Beneficiaries	**232**	**223**	**455**	**367**	**358**	**725**

Source: Medicare Enrollment Database and National Claims History File.

Notes: The intake date used in this table is the date of enrollment for participants. For eligible nonparticipants, the intake date is July 15, 2002, the midpoint of the six-month enrollment period examined.

Participants who do not meet CMS's demonstration-wide requirements, had an invalid HIC number on MPR's enrollment file, or were identified as a member of the same household as a research sample member were excluded from this table.

[a]Calculated among beneficiaries with six or more months in Medicare fee-for-service in the two years before intake. (See Note, above, concerning intake date definition.)

[b]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). For example, if a beneficiary was in fee-for-service all 24 months and had two hospitalizations during that time, they would have one hospitalization per year [(12 x 2) / 24]. If another beneficiary was in fee-for-service eight months during the previous two years, and had two hospitalizations during those eight months, they would have [(12 x 2) / 8], or three hospitalizations per year. The estimate of the proportion with no hospitalization in the two years before the month of intake may differ slightly from the proportion with no hospitalization in the two years before the date of intake because the two measure slightly different periods. Someone enrolled on September 20, 2003, whose only hospitalization in the preenrollment period occurred on September 5, 2003, would not be counted as hospitalized during the 24 months before the month of intake. Conversely, someone hospitalized on September 25, 2001, would be captured in the measure defined by month of enrollment, but not in the measure based on the day of enrollment.

ESRD = end-stage renal disease.

*Difference between treatment and control groups significantly different from zero at the .10 level, two-tailed test.

**Difference between treatment and control groups significantly different from zero at the .05 level, two-tailed test.

***Difference between treatment and control groups significantly different from zero at the .01 level, two-tailed test.

had been treated for cancer in the two years before intake; (4) the total number of diagnoses a beneficiary has been treated for in the past two years; (5) Part A, Part B, and total Medicare reimbursement per month enrolled during two years before month of intake; and (6) the proportion of beneficiaries who had a distribution of total Medicare reimbursement per month enrolled in the two years before intake of between $501 and $1,000 and more than $2,000. For the six-month sample, there were also six statistically significant differences between the two groups: (1) the proportion of beneficiaries who are male; (2) the proportion of beneficiaries whose days between last hospital discharge and intake was between 31 and 60; (3) the proportion of beneficiaries who had been treated for peripheral vascular disease in the two years before intake; (4) the proportion of beneficiaries whose annual number of hospitalizations in the two years prior was between 0.1 and 1.0; (5) Part A, Part B, and total Medicare reimbursement per month enrolled during two years before month of intake; and (6) the proportion of beneficiaries who had a distribution of total Medicare reimbursement per month enrolled in the two years before intake of between $501 and $1,000 and more than $2,000.

We would expect roughly this number of false-positive differences to occur by chance, given 45 different characteristics are examined. Furthermore, most of these differences shrink as the sample grows from the four-month total to the six-month total. Thus, none of the differences in this small, early sample create any cause for concern and are expected to shrink further in the next report.

3. Sensitivity Tests

To assess outcomes, Medicare-covered service use and cost were calculated in the two months after the month of randomization. For example, for a person randomized in May, that person's outcomes were tabulated in June and July. To examine whether our results were affected by not including costs and services that occurred closer to the randomization date, we

conducted a sensitivity analysis examining outcomes for three months—during the month the person was randomized, as well as the two months after randomization (Table B.7). Other than outpatient hospital services, which are insignificant in the three-month period and significant in the two-month period shown in Table 5, the results were similar to those for outcomes measured over the two-month period (Table 5 in text). Thus, the results are not sensitive to how the month of randomization is treated.

TABLE B.7

MEDICARE-COVERED SERVICE USE DURING THE MONTH OF RANDOMIZATION AND THE FOLLOWING TWO MONTHS FOR EARLY ENROLLEES

	Treatment Group	Control Group	Difference[a]
Inpatient Hospital Services			
Any admission (percent)	17.2	17.5	–0.3
Mean number of admissions	0.24	0.24	0.00
Mean number of hospital days	1.72	1.72	0.01
Emergency Room Services			
Any emergency room encounters (percent)			
Resulting in admission	12.5	11.7	0.8
Not resulting in admission	9.1	13.0	–4.0
Total	21.1	23.8	–2.7
Mean number of emergency room encounters			
Resulting in admission	0.16	0.14	0.01
Not resulting in admission	0.11	0.15	–0.04
Total	0.27	0.29	–0.02
Skilled Nursing Facility Services			
Any admission (percent)	1.7	1.4	0.4
Mean number of admissions	0.02	0.01	0.00
Mean number of days	0.47	0.23	0.24
Hospice Services			
Any admission (percent)	0.9	0.5	0.4
Mean number of days	0.32	0.13	0.19
Home Health Services			
Any use (percent)	9.1	8.1	1.0
Mean number of visits	1.36	0.85	0.51
Outpatient Hospital Services[b]			
Any services (percent)	67.7	63.7	4.0
Physician and Other Part B Services[c]			
Any use (percent)	94.0	96.4	–2.5
Mean number of visits or claims	6.9	7.3	–0.4
Mortality Rate (percent)	2.6	2.7	–0.1
Total Medicare Reimbursement[d]			
Part A[e]	$2,481	$1,562	$918
Part B	$1,417	$1,268	$149
Total	$3,897	$2,830	$1,067
Reimbursements for Care Coordination[f]	$281	$0	$281***
Number of Beneficiaries	**232**	**223**	

Source: Medicare National Claims History File.

Note: Sample includes those enrolled during the first four months of program operations. Participants were excluded from this table if they had an invalid HIC number on MPR's enrollment file, were identified as a member of the same household as a research sample member, or did not meet Medicare coverage and payer requirements (defined as having Medicare as a secondary payer, being in Medicare managed care plan, or not having Part A and Part B coverage) during the month of randomization. Patient-months were excluded if the participant did not meet the above Medicare coverage and payer requirements that month or had died in a previous month.

"Percents with any medical encounter type" are the percent of treatment or control group members who have at least one encounter of a particular type; "mean numbers of medical encounter types" are the average number of encounters of a particular type per treatment or control group member.

[a]The direction of the treatment-control difference does not by itself signify whether the program is "effective." That is, for some outcomes a statistically significant negative difference (such as lower hospitalization rates for the treatment group than for the controls) suggests that the program is working as intended. However, a positive difference for other outcomes, such as number of physician visits, does not necessarily mean the program is ineffective or having adverse effects, because the program may encourage patients to see their physician more regularly for preventative care or to obtain recommended laboratory tests for their target conditions than they would have in the absence of the demonstration.

Due to rounding, the difference column may differ slightly from the result when the control column is subtracted from the treatment column.

[b]Includes visits to outpatient hospital facilities as well as emergency room visits that do not result in an inpatient admission. Laboratory and radiology services are also included.

[c]Includes diagnostic laboratory and radiology services (including pathologist and radiologist services) from nonhospital providers, suppliers and devices, mammography, ambulance, covered medications, blood, and vaccines.

[d]Does not include reimbursement for care coordination services provided by demonstration programs.

[e]Includes reimbursement for inpatient, skilled nursing facility, hospice, and all home health care (including that paid under Medicare Part B). Excludes reimbursement for care coordination services provided by demonstration programs.

[f]This is the average amount paid to the program as recorded in the Medicare claims data for the month of randomization and the two following months. The difference between the recorded amount and three times the amount the program was allowed to charge per-member-per-month may reflect billing errors, delays, or payment adjustments for patients who disenrolled.

*Difference between treatment and control groups significantly different from zero at the .10 level, two-tailed test.
**Difference between treatment and control groups significantly different from zero at the .05 level, two-tailed test.
***Difference between treatment and control groups significantly different from zero at the .01 level, two-tailed test.

APPENDIX C

SELECTED PROGRAM DOCUMENT

TABLE C.1

DOCUMENTS INCLUDED

Telephone interview script

Informed consent form

Assessment profile

Self-management assessment

Initial contact questionnaire—diabetes

Care manager feedback report

Patient care plan and agreement—diabetes management

Acuity level rating table

CCM orientation checklist

Reports generated at the program level
- Administrative aggregate report—diabetes 12/1/02-12/31/02
- Administrative aggregate report—CVD 12/1/02-12/31/02

Care management satisfaction survey (patient)

Sample letter to physicians with clinical report

Physician information (physician marketing materials)

CenVaNet Health News (patient newsletter)

Standard of Care Card—diabetes