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

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Policy Research, Inc.

The Mercy Medicare Coordinated Care Demonstration Program After One Year

Final Report

May 28, 2004

Karen Sautter
Jennifer Schore
Randall Brown
Sherry Aliotta
Deborah Peikes
Sean Orzol

Submitted to:

Centers for Medicare & Medicaid Services
Office of Strategic Planning
C3-20-17
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

The authors would like to thank the many people who contributed to this report by sharing their experiences with the Mercy Medicare Coordinated Care Demonstration program, by reviewing earlier drafts of the report, and by providing direct assistance with its development. First, we thank Nancy Halford and her staff at Mercy, who answered numerous questions about their program since it began enrolling patients in April 2002. Next, we thank our project officer, Carol Magee, and her CMS colleagues Cynthia Mason, Renee Mentnech, and Sid Mazumdar. Finally, we thank our MPR colleagues: Nazmul Khan, Stephanie Chin, and Amy Zambrowski (who provided programming support), Glen Mays (who reviewed the report as a project outsider), Pat Ciaccio and Roy Grisham (who edited the report), and last, but certainly not least, Bryan Gustus (who produced the report).

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EXECUTIVE SUMMARY

The Medicare Coordinated Care Demonstration, mandated by the Balanced Budget Act of 1997, is testing a range of 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, through both impact and implementation analyses.

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.

This report describes Mercy Medical Center North Iowa's (MMC/NI's) Medicare Coordinated Care Demonstration Project, which Mercy calls its Case Management Demonstration Project (CMDP). MMC/NI, based in Mason City, Iowa, is a rural health care delivery system serving northern Iowa. The prototype for the CMDP is Mercy's outpatient case management program, which Mercy believes has reduced inpatient and emergency room use.

Program Organization and Approaches. The Mercy CMDP is headquartered on the MMC/NI main medical campus in Mason City, Iowa. The program director, medical director, office manager, social worker, chaplain, and support staff are housed in the main office. Some of the care coordinators (called "case managers" by the program) are located in physician's clinics. The case manager supervisor and the other case managers work from either the main office or satellite offices.

The program has adopted two main approaches to improving patient health and reducing health care costs: (1) improving communication and coordination among patients and physicians, and (2) improving patient adherence to treatment recommendations. The program aims to improve communication and coordination by teaching patients how to coordinate their own care and more effectively communicate with their physicians. The program seeks to improve patient adherence to treatment recommendations by teaching patients to be better self-managers.

Patient Identification. The Mercy CMDP began enrolling patients in April 2002. Mercy requires that patients have had one or more in-patient stays or emergency room visits at MMC/NI or its affiliated hospitals for at least one of the following diagnoses: congestive heart failure (CHF), chronic obstructive pulmonary disease or other chronic lung disease, liver disease, stroke, vascular disease, or renal failure. Participants must also live in Mercy's defined service area, which includes 15 counties in northern Iowa. The Mercy CMDP identifies about 90 percent of its enrollees by reviewing lists of discharged patients generated by MMC/NI and its affiliated hospitals. Physicians are then asked to review these lists and eliminate patients who are not appropriate for the program. For example, a physician might determine a patient would not benefit from the intervention or that cognitive problems would limit the usefulness of the intervention for a patient. After a potential patient has been identified and their physician has approved their participation, a case manager sends the patient a letter describing the program. The letter is signed by the patient's physician. The case manager calls the patient, using a script to solicit participation and answer questions about the program. If the patient wishes to enroll, the case manager schedules a visit with the patient to obtain informed consent.

During the program's first year, more than 95 percent of the 62 physicians of treatment group patients were employed by MMC/NI. Many of these physicians had worked with program staff through Mercy's outpatient case management program. Other Mercy physicians were introduced to the CMDP through presentations by program staff at Mercy clinics. Program staff gave presentations to or had individual discussions with the remaining five percent of participating physicians as their patients were identified for participation.

Assessment, Care Planning, and Monitoring. The Mercy CMDP is similar to other programs in the demonstration in that it conducts assessment, care planning, and monitoring activities. Following random assignment to the treatment group, each patient receives a comprehensive assessment in their home that covers medical history, functional status, nutrition, psychosocial status, availability of social support, home safety, spiritual needs, and medications. From the assessment, the case manager develops an individualized care plan for each patient in collaboration with the patient and the patient's family or caregiver. Case managers assess progress the patient is making toward resolution of the identified problems and the goals established in the care plan by visiting them in their home or by telephoning them at least once a month. In addition, some patients with CHF use a home monitoring program called "Tel-Assurance" that records their weight and asks them questions about their symptoms every day.

Staffing and Management of Program Quality. The Mercy CMDP case managers must be baccalaureate- or master's-prepared registered nurses licensed to practice in Iowa. All case managers complete a four-week orientation under the direction of an experienced case manager. The program director does an annual formal evaluation of case manager performance, based on

program objectives. The program provides financial incentives to case managers for improving their individual and group performance. All case managers meet once a month with the program director to discuss overall operational issues and progress toward program objectives. The program has not experienced turnover among case managers.

The Mercy program uses a homegrown software program called the Case Management Information System (CMIS) to track all case management encounters, evaluation data, clinical data, interventions, medication lists, laboratory tests, provider visits, and case managers' narrative notes. Only program staff have access to the CMIS. The program does not regularly generate reports to monitor its activities, although it is developing its first annual report, which describes enrollment and patient outcomes such as quality of life and health care utilization. The program director also shares enrollment statistics with the senior leadership of MMC/NI during their semiannual meetings.

WHO ENROLLS IN THE PROGRAM?

Program staff met (and have exceeded) their enrollment target of 482 patients overall in the treatment and control groups during the first year. They have done so with almost no modifications to the original approach to identifying patients. After one year of operation, the Mercy CMDP had enrolled 627 patients in the study, with 317 randomly assigned to the treatment group and 310 to the control group. The program's enrollment success can be attributed to its access to a comprehensive data system to identify patients and to physician support based on previous experience with Mercy's outpatient case management program.

To gain another perspective on the proportion of eligible beneficiaries enrolling in the program and to describe their characteristics, the evaluation simulated the Mercy CMDP eligibility criteria using Medicare enrollment and claims data. July 15, 2002 was used as a pseudo-enrollment date for nonparticipants; it is roughly the midpoint of the 6-month enrollment period considered here.) The simulation showed that, during the program's first 6 months of operation, 291 out of an estimated 11,623 eligible beneficiaries enrolled (about 3 percent). Many of the eligible nonparticipants may not have been identified by or contacted by the program because they did not receive care through the MMC/NI system but did live in the area and met the diagnostic and utilization criteria.

Program participants differed demographically from eligible nonparticipants. Participants were less likely to be very elderly: 15 percent were versus 24 percent of eligible nonparticipants. Participants were more likely to be male (56 versus 46 percent), but less likely to be poor (13 percent received Medicaid benefits versus 17 percent of eligible nonparticipants).

Participants were more likely to have medical conditions targeted by the program and thus had higher Medicare costs before enrolling than eligible nonparticpants. Two-thirds had CHF, 60 percent had COPD, and 20 percent had renal disease (as compared with 42, 45, and 10 percent of eligible nonparticpants, respectively). As a result, participants were more likely to have been in the hospital in the month and year before enrolling. They also had higher Medicare costs per month during the year: $1,249 versus $610 for eligible nonparticipants.

When developing the cost estimate for its waiver application, MPR estimated that Medicare costs would average $1,282 per month for control group members during the demonstration period. It thus appears that the program has enrolled patients who have the same high costs as planned.

Program staff report that patients who have enrolled are highly satisfied with program services and have begun to see that they are moving toward better self-management and symptom control. Voluntary disenrollment during the first six months was extremely low. Only one of the 317 patients disenrolled, saying that the program made her "too nervous."

TO WHAT EXTENT DOES THE PROGRAM ENGAGE PHYSICIANS?

Collaboration between physicians and case managers is part of the prototype outpatient case management program and thus is a familiar concept for some Mercy physicians and case managers. The program expects that physicians will (1) approve patient participation, (2) support recruitment by signing the introductory letter sent to eligible patients, (3) review and approve care plans, and (4) respond to case managers' concerns about specific patients' conditions and problems as part of the ongoing monitoring process.

Physicians in four Mercy clinics may see case managers every day because some of the case managers practice in the clinics. Although the rest of the case managers do not work in the clinics, these community-based case managers see physicians in their offices regularly. Mercy also asks physicians to allow case managers to change the dosage of medications under specified circumstances (for example, increase dosage of a prescribed diuretic when a patient experiences fluid retention). Staff report that about half the physicians they work with provide case managers with such medication orders. Efforts to engage physicians appear to have succeeded within the program's expectations. Physicians have identified which of their patients are appropriate for the program and have not raised active barriers to program implementation.

The program seeks to improve physicians' understanding of the value of case management in their practice. The program wants to show physicians that patient health improves and patients take less of their time to care for when they receive case management. Case managers do sometimes ask physicians questions about treatment or suggest medications. However, case managers do not routinely review physicians' treatment for adherence to guidelines. A basic concept of the program is that the physician is in charge of patient care. Program staff believe they have developed rapport between the case managers and physicians. The program's medical director has not had to handle any disagreements between case managers and physicians. Although the program has not surveyed physicians about their satisfaction with the program, staff report anecdotally that physicians view case management as an important resource.

HOW WELL IS THE PROGRAM IMPLEMENTING KEY INTERVENTION APPROACHES?

Improving Communication and Coordination. One of the program's approaches to improving patient health is to teach patients to communicate more effectively about and self-manage their health, advocate for themselves, and coordinate their own care. Case managers

TABLE 1

CHARACTERISTICS OF MERCY CMDP 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	4.6	5.1
65 to 84	80.2	71.3
85 or older	15.2	23.6
Male	56.4	45.9
Nonwhite	0.3	0.6
Medicaid Buy-In for Medicare A or B	12.5	16.6
Medical Conditions Treated in Last Two Years		
Congestive heart failure	66.3	42.3
Chronic obstructive pulmonary disease	59.4	45.1
Stroke	30.7	27.6
Peripheral vascular disease	23.7	20.6
Renal disease	19.7	10.3
Hospital Discharge in Last Year	67.7	34.7
Hospital Discharge in Last Month	7.7	4.0
Total Medicare Reimbursement per Month (dollars)	$1,249	$610
Number of Beneficiaries	**303**	**11,332**

Source: Medicare Enrollment Database and National Claims History.

[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 for them. Participants who are members of the same household as a research sample member are included above, but are not part of the research sample.

gauge patient communication skills during the assessment and routine home visits. Case managers teach patients how to communicate more effectively with physicians by sitting with them while they schedule appointments, teaching them what to ask their physician during appointments, and providing patients with medication cards to take with them to appointments. Case managers will intervene on behalf of their patients to schedule doctor's visits and arrange transportation to those visits if necessary. Communication between case managers and physicians is primarily informal. Depending on the location of the case manager, informal communication may occur in person in the clinic, by phone, and by fax or mail (in progress notes). Case managers call physicians when a patient's condition changes.

Mercy seeks to better coordinate patient care in a number of ways. One of the program's approaches to improving care coordination is having case managers present all new patients to a multi-disciplinary team. These monthly meetings (called "grand rounds" by the program) include all program staff and other Mercy-affiliated personnel (for example, the MMC/NI hospice director and a home care representative). Grand rounds help case managers develop care plans for new enrollees. The program also uses grand rounds as an opportunity for case managers to brainstorm about particularly difficult patients and those who have just experienced adverse events. Case managers also aim to improve coordination by making sure that patients receive timely and appropriate diagnostic tests and that test results are available to the physicians during patient visits.

Mercy further aims to make patient care more coordinated by finding out when adverse events occur, determining how to avoid repeat occurrences, and communicating their occurrence to physicians. Case managers learn about patients' adverse events primarily through daily review of emergency room admissions to Mercy hospitals. When an adverse event occurs, the case manager will work with the patient and the patient's family or caregiver to identify what triggered the event and what can be done to prevent or minimize future occurrences. The case manager will also contact the physician, either by phone or by sending them a progress note, to learn whether the patient's treatment will change. Case managers follow up with the hospital discharge planner to ensure the patient receives appropriate care after being released from the hospital.

Improving Patient Adherence. To improve adherence, the Mercy CMDP has developed a flexible, individualized educational intervention supported by a disease-specific curriculum, written materials, and community resources. The program also has special materials and support structures for addressing the needs of patients with visual impairments or cognitive deficits. All the case managers receive training on patient education upon hire and informally afterwards from their peers and the medical director. For the 10 CHF patients with the Tel-Assurance home monitoring program, case managers can assess whether their teaching has been effective, encourage patients to be more adherent, and provide opportunities for reinforcement of education concepts such as self-management. For the majority of patients, the program assesses teaching effectiveness by repeating parts of the assessment tool and asking about or observing patient behavior. If a patient is not learning, the case manager will continue to reinforce educational concepts or revise the approach, sometimes seeking the advice of the multi-disciplinary team during grand rounds. According to program contact logs, among the 159 patients enrolled in the CMDP during its first six months, 83 percent had received at least one contact for self-care or disease-specific education, and almost half had at least one contact during which the case manager explained medications. Fewer patients (12 percent) had at least one contact during which the case manager explained tests or procedures.

Increasing Access to Services. Although the Mercy CMDP refers patients to a wide variety of services (or, if necessary, arranges services on their behalf), increasing access to services is not a major focus of the program. The services that staff referred patients to most frequently at the time of our visit were transportation and personal care. The program also distributes senior citizen resource guides to patients that are tailored to their county of residence. Case managers may help patients apply for public programs or other benefits, including medication assistance programs. The program has a social worker and chaplain on staff to make the referral process

easier. The program does not pay for services or resources, although it does pay for Tel-Assurance home monitoring for those CHF patients using it, and did so for one patient during the first six months of the program. Case managers referred only five percent of patients to Medicare-covered services or arranged services for them during the first six months of the program. However, case managers referred 87 percent of patients to non-Medicare-covered services.

WHAT WERE ENROLLEES' MEDICARE SERVICE USE AND COSTS?

This report presents preliminary estimates of Medicare service use and costs for the Mercy CMDP for those enrolled during the first four months of intake. The follow-up period (the first two full months after random assignment) is too short to draw inferences about the true effects of the CMDP over a longer period. Total Medicare reimbursement for the 96 treatment group members, exclusive of demonstration costs, were $1,899, on average, during the first two months after enrollment, compared with $2,606 for the 94 control group members. This difference ($708 or 27 percent), while sizeable, is not statistically significant. It stems from a smaller percentage of treatment group patients having been hospitalized during the period. The net treatment-control difference in costs is $204, when one takes into account the CMS program payment ($454 over two months or $227 per month). It is too soon to tell whether this early difference in Medicare costs will continue and whether the intervention will ultimately result in lower costs and improved patient health.

CONCLUSION

Program Strengths and Unique Features. The Mercy CMDP appears to have many of the features research has shown to be associated with effective care coordination.

- The program ***targets patients with high health care costs*** and uses searchable databases to identify potential participants. After eligible patients are identified, physicians approve their participation and sign letters inviting patients to participate.
- The program administers a ***comprehensive, in-person assessment*** and develops assessment-based care plans using a care plan template individualized to meet patient needs. The program ***monitors patients' progress*** in meeting care plan goals primarily with regular home visits or telephone calls.
- Case managers must be ***baccalaureate-prepared or advanced practice nurses***. The program provides each case manager with extensive case management training. The program director formally evaluates case manager performance based on program objectives annually.
- Mercy ***facilitates collaboration between case managers and physicians*** by placing some of its case managers in clinics with the physicians and having case managers visit all other physicians' practices regularly. The program also asks physicians to give case managers permission to change the dosage of medications under specified circumstances.

- Case managers coordinate care by ***teaching patients to be better self-managers*** and communicate with their physician, and scheduling necessary or routine doctor's appointments for patients when they are reluctant to do so. Case managers ***send physicians progress notes or call them*** when a change in patient status occurs.

- The education intervention is based on a single, flexible ***curriculum that can be tailored to each patients' specific needs***. Case managers assess teaching effectiveness during routine monitoring and ***reinforce educational concepts*** or revise their approach when patients are not progressing as expected.

- The program arranges for a number of support services and resources, and provides patients with ***assistance in applying for public programs*** and benefits, such as medication assistance programs. The staff includes a social worker and chaplain who facilitate patient referrals to appropriate services and resources.

- Case managers have a ***financial incentive to meet program-wide objectives***. The program does not provide financial incentives to physicians or pay them for their participation.

Potential Barriers to Program Success. The Mercy CMDP program design contains no obvious barriers to the ultimate success of this program. However, except for an annual report, the program lacks a process for generating regular reports for reviewing outcomes other than those associated with enrollment. The Mercy CMIS has the capacity to generate such regular reports.

An early analysis of Medicare data suggests that the Mercy CMDP may reduce hospitalizations and overall Medicare costs. While these early treatment-control differences are not statistically significant, they suggest that Mercy may be able to reduce Medicare costs enough to cover its care coordination fees. Data on a larger group of patients over a longer period will be needed to ascertain the true program effects.

INTRODUCTION

The Medicare Coordinated Care Demonstration, mandated by the Balanced Budget Act of 1997, is testing a range of 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—hosted by organizations as diverse as hospital systems, disease management providers, and retirement communities—are serving patients in 17 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, the data and methodology used in these reports are described, and an overview of the program is given. Then the following questions are addressed: Who enrolls in the program among the beneficiaries it targets? 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 expenditures during the first six months of operation? The report concludes with a discussion of the program's strengths and unique features, as well as potential barriers to program success.

This report describes Mercy Medical Center North Iowa's (MMC/NI's) Medicare Coordinated Care Demonstration Project, which the program calls its Case Management

[1]The CMS Medicare Case Management Demonstration for Congestive Heart Failure and Diabetes Mellitus is also part of the MPR evaluation. Appendix Table A.1 lists all demonstration programs and locations.

Demonstration Project (Mercy CMDP).[2] MMC/NI, based in Mason City, Iowa, is a rural health care system serving northern Iowa. The Mercy CMDP enrolls Medicare beneficiaries with congestive heart failure (CHF), chronic lung disease, liver disease, stroke, vascular diseases, and renal failure. It began enrollment 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, as well as in-person interviews conducted about six months later. For each program, one of three MPR implementation team members conducted the telephone and in-person interviews using semi-structured protocols covering 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 program 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 specific issues of importance to each program. The structure of the protocols will also make synthesizing findings across programs more efficient. MPR staff reviewed written materials each program provided, including the program's proposal to CMS, its operational protocol, materials it provided to patients and physicians, and the forms used in its operation. (Appendix Table A.2 contains a full list of documents reviewed for this report.) This analysis also includes an examination of data each program collected specifically for the

[2]For a detailed description of Mercy's demonstration implementation plans and early experiences, see Aliotta et al. (2003).

evaluation, describing care coordinator contacts with patients, patient disenrollment, and any goods 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 Mercy CMDP service area who were eligible for the program and the percentage who actually enrolled during the program's first six months of operation. 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 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 either to 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.

This 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, 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 MERCY CMDP

Program Organization and Relationship to Physicians. Mercy Medical Center North Iowa (MMC/NI) is a rural health care system based in Mason City, Iowa. It consists of a large primary care hospital and several rural hospitals, primary care clinics, and other facilities (MMC/NI Web site 2003). MMC/NI is one of seven major medical centers belonging to the Mercy Health Network (MHN), an association operated jointly by two nonprofit health care organizations: Trinity Health in Novi, Michigan, and Catholic Health Initiatives in Denver, Colorado.[3] MHN provides integrated financial and management services to each of its members but does not own them (Mercy Health Network Web site 2003).

MMC/NI has several years of experience providing community- and hospital-based case management, including its small, outpatient case management program which serves Medicare and non-Medicare patients with complex chronic conditions and high health care use. CMDP control group members are not eligible to participate in the outpatient case management program. After 10 years of operation, Mercy reports that its outpatient case management program, which was the prototype for Mercy's CMDP, decreased the length of hospital stay and frequency of emergency room visits and hospitalizations for its participants. The CMDP has largely replaced the outpatient case management program, except that patients who were already

[3]The other major Iowa medical centers participating in the Mercy Health Network are based in Centerville, Clinton, Des Moines, Dubuque, New Hampton, and Sioux City. Each medical center changed their name to "Mercy Medical Center" when their partnership was formed in 1999.

receiving case management when the demonstration started may continue to do so outside the demonstration.[4]

The Mercy CMDP main office is located on the MMC/NI medical campus in Mason City, Iowa. The program director, medical director, office manager, social worker, chaplain, and support staff are housed in the main office. Some of the care coordinators (called "case managers" by the program) are located in MMC/NI affiliated internal medicine and family practice clinics where they work alongside the physicians of demonstration patients. The other case managers are housed outside of physician clinics, either in the main office or in satellite offices in Algona, Britt, and Hampton, each of which is within 50 miles of the main office. All case managers, regardless of where they are based, see patients in their homes or contact them by telephone. After nine months of operation, the program had eight baccalaureate-prepared nurse case managers, four nurse practitioner case managers, one full-time social worker, one part-time chaplain, and two office support staff members. Ultimately, when the program reaches its full enrollment of about 340 treatment group patients, the program anticipates case manager caseloads of 40 to 60 patients each.

Originally, the program envisioned a care coordination model that relied more heavily on nurse practitioners, because the program had thought physicians would trust them to make small changes in the medical management of patients (for example, prescribing diuretics in response to fluid-associated weight gain). However, as the demonstration progressed, it became clear to program staff that physicians were not utilizing the nurse practitioners for these skills and that

[4]Physicians who are reluctant to submit a patient to the demonstration's random assignment process may request that a patient be placed in the outpatient case management program. Mercy formally reviews these requests. After one year, only one patient had been diverted to the outpatient program. Another patient was seen on a short consultative basis because the patient did not wish to take part in the demonstration.

registered nurses would sufficiently address the needs of patients. The program has twice as many registered nurses as nurse practitioners on staff, but their responsibilities for patient care do not differ.

During the program's first year, MMC/NI employed more than 95 percent of the 62 physicians of treatment group patients. Many of these physicians had worked with program staff through Mercy's outpatient case management program. Other Mercy physicians were introduced to the CMDP through presentations by program staff at Mercy clinics. Program staff gave presentations to, or had individual discussions with, the remaining 5 percent of participating physicians as their patients were identified for participation.

Primary Approaches. The program has adopted two main approaches to improving patient health and reducing health care costs: (1) improving communication and coordination among patients and physicians, and (2) improving patient adherence to treatment recommendations. The program aims to improve communication and coordination by teaching patients how to coordinate their own care and more effectively communicate with their physicians. The program seeks to improve patient adherence by teaching patients to be better self-managers.

Target Criteria and Patient Identification. As in all 16 demonstration programs, beneficiaries must meet CMS's insurance payer and coverage requirements for the demonstration: (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. Beneficiaries must also meet Mercy's specific targeting criteria. The Mercy CMDP requires that patients have had one or more in-patient stays or emergency room visits at MMC for at least one of the following diagnoses: CHF, chronic obstructive pulmonary disease (COPD) or other chronic lung disease, liver disease, stroke, vascular disease, or renal failure. Participants must also have adequate environmental and social supports to live safely in the community, and they must live in Mercy's

defined service area, which includes 15 counties in northern Iowa.[5] The program excludes patients who have a terminal illness that qualifies them for hospice care, or live in a nursing home or long-term care facility. The program targets beneficiaries with renal disease but excludes individuals classified as having end-stage renal disease.[6] Mercy excludes patients who were receiving services from MMC/NI's outpatient case management program when the demonstration started but does not exclude those who *previously* participated, although no previous participants had been admitted to the demonstration program as of April 2003.

The Mercy CMDP identifies potentially eligible patients primarily by using MMC/NI's Sunrise Decision Support Manager (SDSM), an automated system that contains financial, demographic, diagnostic, and service use information for all patients who have been treated in the emergency room or as an inpatient at MMC/NI. The smaller, outlying hospitals have a similar system called Dairyland, which the program also uses to identify potential patients. Data management staff query these data systems every three to six months by using program target diagnosis codes and other eligibility criteria, and a case manager manually reviews all queries to verify eligibility for the demonstration.[7] The program also reviews inpatient and emergency room lists from the main MMC/NI hospital for potentially eligible patients on a daily basis. Physicians are then asked to review these lists of eligible patients and eliminate those patients

[5]The counties, which are all in northern Iowa, are Butler, Cerro Gordo, Chickasaw, Floyd, Franklin, Hancock, Hardin, Howard, Humboldt, Kossuth, Mitchell, Palo Alto, Winnebago, Worth, and Wright.

[6]If a patient develops end-stage renal disease after admission into the demonstration, the program retains the patient.

[7]Initially, Mercy queried these databases for hospital admissions and emergency room visits within the previous year. As enrollment progressed, the program expanded its search criteria to the previous two years. However, the program does not restrict eligibility to patients who were hospitalized or who visited the emergency room within a specific timeframe.

who are not appropriate for the program. For example, a physician might determine a patient would not benefit from the intervention or that cognitive problems would limit the usefulness of the intervention for a patient. After a potential program patient has been identified, a case manager sends the patient a letter signed by the patient's physician and the program's medical director (see Appendix C for the patient recruitment letter). Using a script that highlights how patients will benefit from participating in the program, the case manager calls the patient to describe the program, explain randomization, and answer questions from patients who initially decline to participate (see Appendix C for the telephone recruitment script). If the patient wishes to enroll, the case manager will schedule a visit to obtain informed consent.

Although queries of SDSM and the Dairyland system were the source from which about 90 percent of all individuals who enrolled in the program were identified, the program does receive direct referrals. Physicians directly referred 9 percent of all program participants. The program has made presentations to physicians at Mercy-affiliated clinics in the service area, as well as selected clinics outside the Mercy North Iowa network that provide primary care to patients already enrolled in the program. The program has also received referrals from MMC/NI hospital staff and MMC/NI's home health agency.

The program has received self-referrals, although these account for less than 1 percent of all enrollees. Mercy has publicized the program to potential patients in a variety of ways. In addition to the brochure included in the admission packet, Mercy has developed an informational flyer for display in physicians' examination rooms and press releases for local media (for example, newspapers and radio) accessible to Iowa residents (see Appendix C for the program informational flyer). At the time of our visit, the program's chaplain and a case manager had just begun making presentations to clergy. Although these presentations focused on educating clergy about the program and the role they might play in providing spiritual care, these informational

sessions have generated some referrals. For example, some patients have called to enroll because they saw a program flyer displayed on their church bulletin board.

The program added a patient identification approach as the computer-generated lists and direct referrals identified fewer and fewer eligible patients over time. The program now reviews the weekly list of patients scheduled for appointments in one large clinic where one of the program's case managers is housed. The case manager obtains the list every week and scans patients' records for eligibility criteria. The program reports that this approach has allowed it to identify 8 to 10 patients per week previously unidentified by computer query or direct referral.

Assessment, Care Planning, and Monitoring. After random assignment to the treatment group, each patient is assigned to a case manager based primarily on the location of the patient's home and, to some extent, on the patient's primary care provider. The case manager then conducts an assessment of each patient in his or her home. The Mercy CMDP assessment tool is modeled on MMC/NI's home care assessment and covers medical history, functional status, nutrition, psychosocial status, availability of social support, home safety, and medications. In addition, the case manager performs a physical and spiritual assessment, creates a plan with the patient for dealing with emergencies (that is, when to go the emergency room and what phone numbers to call), and identifies needs for services including referrals to the program's social worker or chaplain.[8] The assessment generally takes two one-hour home visits to complete. The results of the assessment are documented on paper and become a permanent part of the patient's

[8]The spiritual assessment and social worker referral form were added to the program's assessment about six months after enrollment began. The program's chaplain developed an assessment tool in response to the number of spiritual care needs identified by case managers. The program added the social worker referral form because MMC/NI requires that the program file a formal request for social worker services before service can be initiated.

medical record (see Appendix C for the emergency plan, spiritual assessment, and social worker referral forms).

Case managers formally reassess patients six months after enrollment, and annually thereafter.[9] However, the program considers assessment to be an ongoing, dynamic process that occurs informally at each patient encounter. Patients are also reassessed after major "trigger" events, such as hospitalizations, exacerbations of an acute illness, and falls. After these types of events, the case managers increase the intensity of the monitoring to identify causes or patterns.

Between April and October 2002, the first six months of program operation, 159 patients enrolled and were randomly assigned to the Mercy CMDP treatment group (Table 1). Among those patients enrolled, 82 percent of patients (130) had at least one contact for assessment. [10] Among those contacted for assessment, almost 89 percent had their first contact within two weeks of random assignment. The program's goal is to assess all newly enrolled patients within two weeks. The few delays in performing assessments usually were due to difficulty in scheduling as patients may have scheduled surgery or a vacation during that two-week window.

The case manager, in collaboration with the patient and his or her family/caregiver, develops an individualized care plan for the patient based on the assessment using diagnosis-specific care plan templates (see Appendix C for care planning form). It includes short-term goals (for example, testing blood sugars regularly) and long-term goals (such as improved medication adherence), as well as a list of problems and the interventions. The care plan is used as a guide for all subsequent patient contacts and is reviewed annually. Physicians review the care plans

[9]The six-month reassessment differs from the initial and annual assessments in that it only assesses functional status, well-being, symptom control, and quality of life.

[10] The remaining 29 patients were newly enrolled and awaiting assessment.

TABLE 1

CASE MANAGER CONTACTS WITH PATIENTS
DURING FIRST SIX MONTHS

Number of Patients Enrolled[a]	159
Number of Patients with at Least One Case Manager Contact[b]	142
Total Number of Contacts for All Patients	734
Mean Number of Contacts per Patient, Among Those Contacted	5
Number of Case Managers Contacting Patients	14
Among Those Patients with at Least One Contact:	
Percentage of contacts case manager initiated	90.5
Percentage of contacts in person at patient's residence	71.9
Percentage of contacts by telephone	17.3
Percentage of contacts in person elsewhere	10.8
Of all Patients Enrolled, Percentage with Assessment Contact	81.8
Among Those Patients with an Assessment, Percentage of Patients Whose First Assessment Contact Is:	
Within a week of random assignment	50.0
Between one and two weeks after random assignment	38.5
More than two weeks after random assignment	11.5
Of All Patients Enrolled, Percentage of Patients with Contacts for:	
Routine patient monitoring	88.7
Providing emotional support	84.9
Providing disease-specific or self-care education	83.0
Explaining tests or procedures	11.9
Explaining medications	48.4
Monitoring abnormal results	40.9
Identifying need for non-Medicare service[c]	87.4
Identifying need for Medicare service	5.0
Monitoring services	11.9
Average Number of Patients Contacted per Case Manager	10.1
Average Number of Patient Contacts per Case Manager	52.4

Source: Mercy program data received November 2002 and updated July 2003. Covers six-month period beginning April 19, 2002 and ending October 15, 2002.

[a]Number of patients enrolled in the treatment group as of October 15, 2002.

[b]Contacts described in this table include those made by case managers, social worker, and chaplain.

[c]Includes transportation; meals and/or food sources; assistance applying for medication assistance and public programs; personal care, homemaker, companion, or respite care; mental health counseling and spiritual care; dental services; adult day care; housing resources; diabetic and heart failure education classes; and wound and pain clinics.

and verify the accuracy of the medications and treatments listed.[11] Sometimes physicians provide input to the care plan, but physicians are not required to help the case manager develop the care plan. The case manager enters the care plan into the program's stand-alone Case Management Information System (CMIS), a database system that stores all program data. The care plan is also documented on paper as part of the patient's medical record.

Routine monitoring generally includes the case manager assessing the progress the patient is making toward resolution of the identified problems and the goals established in the care plan. Case managers monitor patients either by visiting them in their home or by telephoning them. During home visits, the case manager physically assesses the patient (for example, takes vital signs and/or assesses pain) and examines the patient's home environment (for example, checks the refrigerator for food, assesses the patient' risk of falls, and checks medications). The case manager educates the patient as needed. He or she also identifies caregiver issues, if applicable. The case manager usually calls patients to inquire about their general health. For example, the case manager will ask the patient if he or she has enough medication or if weight has changed. The case manager also calls patients to follow up on issues identified during a prior contact.

The case manager uses his or her own judgment to establish the monitoring frequency and mode (in-person versus telephone), based on the patient's problems and progress toward achieving care plan goals. Case managers contact their patients once every two to three weeks, on average, but once a month at a minimum. The results of the monitoring are documented on an encounter form and entered into the CMIS.

[11] Care plans are not updated more frequently than on a yearly basis to reduce paperwork for physicians. Staff also indicated that the long-term nature of patients' conditions does not warrant more frequent revision of care plans.

The program has had a few patients (known as "snowbirds") temporarily move away from the service area; it is Mercy's policy to monitor these patients in a manner agreed upon by the patient and case manager until the patient returns. The program has served two such patients, with both using a telephonic home monitoring device. Both patients continued using the monitoring device during their absence from the service area and communicated with their case manager by phone.

In order to address the specific self-management needs of patients with CHF, the program uses a telephonic home-monitoring system called Tel-Assurance to monitor a small proportion of CHF patients. Patients using the Tel-Assurance device use an automated call-in system on a daily basis to record their weight and answer six questions about their symptoms. If the patient does not call in, the system will initiate a call to the patient. If a patient gains more than three pounds or answers "yes" to at least two of the questions, the system will alert the program by sending them a computerized variance report. The office manager receives the report and notifies the patient's case manager of the result. At the time of the visit, 10 patients (21 percent of CHF patients enrolled) were using the Tel-Assurance program. The program has had some difficulty getting patients to try Tel-Assurance because patents do not want to monitor themselves daily. Nevertheless, the program would like to interest 25 of its CHF patients in using the device.

Of the 159 patients enrolled during the first six months of operation, 142 (or 89 percent) had at least one contact with a case manager (including contact for assessment). Those patients averaged five contacts during the period. Most contacts (91 percent) were initiated by a case manager, and the majority of contacts (72 percent) were conducted in person in the patient's home; another 11 percent were in person in a physician's office or elsewhere. Although these contacts include those for assessment, 89 percent also had a contact for routine monitoring

during the period. The majority (85 percent) had at least one contact in which they received emotional support from their case manager (Table 1).

Staffing and Management of Program Quality. Maintaining and improving care quality and ensuring programs attain their goals both require staff that have adequate qualifications, training, and supervision, and that management has the tools and support to monitor program progress toward its goals. The Mercy CMDP case managers must be either baccalaureate- or master's-prepared registered nurses licensed to practice in Iowa. All except two of the program's case managers worked for the MMC/NI outpatient case management program prior to joining the CMDP staff. All case managers complete a four-week orientation under the direction of an experienced case manager, who is called a preceptor. Prior to orientation, each case manager completes a self-assessment using an extensive competency checklist. Based on this assessment, the preceptor works through an individualized orientation curriculum with the new case manager that includes assigned readings and ends with a written competency test. Orientation may include training on the following, depending on the experience of the case manager: conducting a physical or service needs assessment, coordination and advocacy, building relationships, applicable regulations and standards, encouraging self-responsibility in patients, patient education, and collaboration with physicians and other program staff. After orientation, case managers receive training on an as-needed basis. During weekly meetings, the medical director may educate case managers about issues that come up when discussing a difficult case (for example, how to educate geriatric patients with depression).

The program director formally evaluates the case manager's performance on an annual basis. For these evaluations, the program director considers peer feedback, patient or staff concerns, productivity measures, and extracurricular activities (for example, publishing, presenting, special projects). The program also considers these reviews as an opportunity to

examine how well the case management team works together. Mercy describes itself as a collegial, "self-governing," and practice-oriented program and views the quality of its case management as the product of team effort, rather than the successes or failures of individual case managers. Financial incentives (merit increases), based on case managers' performance on their personal review and on how the case managers do in meeting their objectives as a group, encourage case managers to learn their craft well. Group objectives are set annually by the program in the following areas: enhancing customer service, valuing colleagues, managing costs, improving quality, improving access, and growing strategically. All case managers meet once a month with the program director to discuss overall operational issues and progress toward program objectives. The program has not experienced turnover among case managers.

The program director reports to the Chief Officer of Operations at MMC/NI and meets with the senior leadership of the hospital (that is, vice presidents, senior vice presidents, and CEO) to give account of the demonstration on a semi-annual basis and as-needed between such meetings. So far, the program director has updated the hospital leadership only on enrollment. The program has not produced any reports to review program outcomes other than those associated with recruitment, but it is in the process of generating its first annual report. This report will describe patient demographic characteristics, patient outcomes (such as quality of life), health care utilization (such as the number of inpatient days), and financial statistics (such as average cost per patient). To generate this report, the program is using CMIS, which Mercy originally developed for their outpatient case management program. The CMIS records all case management encounters, evaluation data, clinical data, interventions, medication lists, laboratory tests, provider visits, and case managers' narrative notes.

WHO ENROLLS IN THE PROGRAM?

Program staff exceeded their enrollment target of 482 patients during the first year by enrolling 627 patients overall in the treatment and control groups. They surpassed their target without having to make modifications to the original approach to identifying patients. The program also appears to have enrolled patients with the planned level of health expenditures, rate of hospitalization, and burden of chronic illness. Staff report that patients are highly satisfied with the program and that they have experienced only minimal voluntary disenrollment.

Enrollment After One Year. After one year of operation, the Mercy CMDP had enrolled 317 patients in the demonstration treatment group and 310 in the control group (MPR weekly enrollment report, week ending April 20, 2003). The program most likely exceeded its first-year target because of its access to a comprehensive data system to identify patients and physician support based on previous experience with Mercy's outpatient case management program.

Only a third of the patients approached did not reply to the program's admission packet or declined to participate.[12] Many beneficiaries did not give a reason for declining the offer, or said they were not interested in the program or did not need the services the program would provide. Among other reasons for declining were: (1) the patient entered a nursing home; (2) a family member said no; (3) the patient moved out of the service area; and (4) the patient said he or she was "too old," "too sick," or "too busy" to participate. Mercy has also had difficulty attracting patients with liver disease to the demonstration, mostly because of the low prevalence of liver disease in the program's service area. Nonetheless, the acceptance rate of 68 percent far exceeds

[12]Between September 1, 2002 and June 30, 2003, the program sent 971 eligible patients an admission packet. Among those beneficiaries, 308 refused to participate or could not be contacted (32 percent), and 663 enrolled (68 percent).

the more commonly seen rates of 25 to 30 percent for voluntary opt-in care coordination programs.

Percent of Eligible Beneficiaries Participating. 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 who chose to participate in the Mercy CMDP. (Appendix B contains a detailed description of the simulation.) This simulation identified 11,623 beneficiaries eligible for the program between April and October 2002, the program's first six months of operation (see Table B.4). That is, they lived in the program's service area, met CMS's demonstration-wide eligibility criteria, and met the program's clinical eligibility criteria.[13] During the same six months, 291 eligible beneficiaries enrolled in the demonstration (about 3 percent of the 11,623 eligible beneficiaries).[14] (See Tables B.2 and B.3.)

[13]Between April and October 2002, 46,230 beneficiaries were living in the program's service area. Of those, 3,210 (7 percent) would have been ineligible for the program because they did not meet one of CMS's demonstration-wide criteria. Of the remaining 43,020 beneficiaries who met these criteria, 11,623 (27 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.)

[14]In fact, 322 beneficiaries actually enrolled in the program during its first six months. When estimating the participation rate, the evaluation excludes enrollees with incorrect Health Insurance Claim (HIC) numbers on MPR's enrollment file, and those who did not meet the Medicare demonstration-wide criteria or the program's geographic, diagnostic, utilization, or exclusion criteria (as measured with Medicare data). These enrollees were excluded from the participation analyses in order to use a consistent definition of eligibility for the numerator and denominator of the ratio. (Beneficiaries may well be eligible, but the beneficiaries' Medicare data could not be obtained to assess that, so they were excluded. The HIC numbers have since been corrected.) This leaves 291 known *eligible* participants. The comparison of participants to eligible nonparticipants in Table 2, however, excludes only participants with invalid HIC numbers and those who did not meet Medicare demonstration-wide requirements, leaving 303 participants. Thus, the comparison more closely reflects the differences between all actual participants and those who were eligible to participate but did not.

Comparison of Participants and Eligible Nonparticipants. According to an analysis of Medicare enrollment and claims data, program participants and eligible nonparticipants differed demographically. Participants were less likely than eligible nonparticipants to be very old. Among the CMDP participants, 15 percent were age 85 or older, compared with 24 percent of eligible nonparticipants (Table 2). Because of this age differential and the greater longevity of females, a higher proportion of participants were male (56 percent, compared with 46 percent of nonparticipants). Participants were also less likely to be poor, as reflected by their eligibility for Medicaid: 13 percent were eligible, compared with 17 percent of nonparticipants. However, the two groups had similar racial composition (more than 99 percent were white) and reasons for Medicare eligibility (roughly 85 percent were originally eligible due to age).

Participants were more likely than eligible nonparticipants to have a series of chronic conditions. During the two years prior to enrolling, 70 percent of participants had been treated for coronary artery disease, 66 percent for CHF, 60 percent for COPD, and 20 percent for renal disease—all target diagnoses for the CMDP. Nonparticipants had significantly lower rates of those chronic conditions. Nonparticipants also had lower rates of cancer and diabetes, which were not target conditions.

As a result of their poorer health, participants had higher hospitalization rates and total Medicare spending than eligible nonparticipants. About 68 percent of participants had a hospitalization in the year prior to enrolling, and participants had monthly Medicare reimbursements of $1,249 over the year prior to enrollment, compared with a 35 percent hospitalization rate and $610 in monthly Medicare reimbursements for eligible nonparticipants.

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)	76.9	77.7	
Younger than 65	4.6	5.1	
65 to 74	31.4	30.4	
75 to 84	48.8	40.9	***
85 or older	15.2	23.6	***
Male	56.4	45.9	***
Nonwhite	0.3	0.6	
Original Reason for Medicare: Disabled or ESRD	15.5	12.4	
State Buy-In for Medicare Part A or B	12.5	16.7	*
Newly Eligible for Medicare (Eligible Less than Six Months)	0.7	0.0	***
Enrolled in Fee-for-Service Medicare 6 or More Months During Two Years Before Intake	99.0	99.8	***
Medical Conditions Treated During Two Years Before Month of Intake[b]			
Coronary artery disease	69.7	46.7	***
Congestive heart failure	66.3	42.3	***
Stroke	30.7	27.6	
Diabetes	38.0	27.1	***
Cancer	27.7	21.5	**
Chronic obstructive pulmonary disease	59.7	45.1	***
Dementia (including Alzheimer's disease)	3.7	5.5	
Peripheral vascular disease	23.7	20.6	
Renal disease	19.7	10.3	***
Total number of diagnoses (number)	3.4	2.5	***
Days Between Last Hospital Discharge and Intake Date[b]			
0 to 30	7.7	4.0	***
31 to 60	7.0	3.8	***
61 to 180	26.3	13.5	***
181 to 365	26.7	13.4	***
366 to 730	24.0	18.1	***
No hospitalization in past two years	8.3	47.3	***

TABLE 2 *(continued)*

	Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants	
Annualized Number of Hospitalizations During Two Years Before Month of Intake[b,c]			
0	8.7	47.6	***
0.1 to 1.0	57.7	38.5	***
1.1 to 2.0	25.7	10.0	***
2.1 to 3.0	6.0	2.9	***
3.1 or more	2.0	1.1	
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]			
Part A	$733	$349	***
Part B	$516	$261	***
Total	$1,249	$610	***
Distribution of Total Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]			
$0	0.0	0.6	
$1 to 500	35.3	68.2	***
$501 to 1,000	24.0	12.7	***
$1,001 to 2,000	21.3	11.0	***
More than $2,000	19.3	7.6	***
Number of Beneficiaries	**303**	**11,332**	

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 Medicare coverage and payer 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.

[c]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). 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.

Participants were also almost twice as likely as nonparticipants to have had a hospitalization in the month before intake (7.7 versus 4.0 percent).[15]

When developing the cost estimate for the Mercy CMDP waiver application, MPR estimated that Medicare reimbursements would average $1,282 per month for eligible beneficiaries who did not participate in the program. With average monthly reimbursements of $1,249 prior to enrollment, it thus appears that the program has enrolled patients with the expected level of health expenditures.

Satisfaction and Voluntary Disenrollment. Program staff report that patients who have enrolled are highly satisfied with program services and have begun to see for themselves that they are moving toward better self-management and symptom control. Anecdotally, staff have heard from families that they like the program because it improves patient health and quality of life, thereby reducing their need for care. Staff believe that the program works best for patients who lack the necessary support system to manage their basic medical needs. This is particularly characteristic of participants residing in remote rural communities, where lack of local primary care is common.

Participants may stay in the Mercy CMDP for the duration of the demonstration (that is, until April 2006). Among the 159 (treatment group) patients who enrolled over the first six months of operation, 34 percent had been enrolled five or more months, while more than three-quarters had been enrolled 10 weeks or less during those six months. Voluntary disenrollment during the first six months was extremely low. Only one patient disenrolled (the patient said the

[15] July 15, 2002 is used as a pseudo-enrollment date for nonparticipants.

program made her "too nervous"). Another six patients died, and one lost her program eligibility during that period (Table 3).[16]

TO WHAT EXTENT DOES THE PROGRAM ENGAGE PHYSICIANS?

While the importance to program success of engaging eligible beneficiaries is self-evident, the importance of engaging physicians may be less so. Case managers must develop trusting, collaborative relationships with primary care physicians in order 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 they get from the case managers 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 case managers' access to physicians when urgent problems arise, and it will facilitate communication and coordination across medical care providers (Chen et al. 2000). Moreover, to increase acceptance of care management among physicians in general, case managers of course need to engage physicians.

The Mercy CMDP is promoted to physicians as a resource or tool to enhance their ability to provide clinical care. The program's structures and procedures support these relationships. Although it is not a goal of the program to change providers' clinical practice, the program strives to increase physicians' awareness of how care coordination can supplement their efforts to maintain or improve patient health.

[16]One patient was ineligible because Medicare was not his primary payer.

TABLE 3

DISENROLLMENT FOR PATIENTS ENROLLED
DURING FIRST SIX MONTHS

Number of Patients Enrolled[a]	159
Length of Enrollment as of October 15, 2002 (Percentage of All Enrollees)	
10 weeks or less	47.8
11 to 20 weeks	30.8
21 or more weeks	21.4
Mean Length of Enrollment (Weeks)	12
Number of Patients Who Disenrolled	8
Number Who Disenrolled Because:	
Patient died	6
Patient lost program eligibility[b]	1
Patient initiated disenrollment	1
Number Disenrolling:	
Within a week after random assignment	1
Between 1 and 4 weeks	2
Between 5 and 12 weeks	2
More than 12 weeks	3

Source: Mercy program data received November 2002 and updated July 2003. Covers six-month period beginning April 19, 2002 and ending October 15, 2002.

[a]Number of patients ever enrolled in the treatment group through October 15, 2002.

[b]Patients can lose program eligibility for the following reasons: Medicare no longer primary payer; joined a managed care plan; entered a nursing home, long-term care facility, or hospice; or moved out of the program's service area.

Collaboration. Mercy views collaboration as an important part of its program. Collaboration between physicians and case managers is part of the prototype outpatient case management program and thus is a familiar concept for some Mercy physicians and case managers. Many of the physicians, particularly those affiliated with MMC/NI, had worked with some of the case managers through the outpatient case management program prior to the demonstration. The program expects that physicians will (1) approve patient participation, (2) support recruitment by signing the introductory letter that is sent to eligible patients, (3) review and approve care plans, and (4) respond to case managers' concerns about specific patients' conditions and problems as part of the ongoing monitoring process.

Physicians in four Mercy clinics became familiar with case managers (if they were not already acquainted through the outpatient case management program) because some of the case managers were stationed in the clinics. Because these are large clinics, physicians may see case managers on a daily basis, although they may not interact everyday unless they attend a patient's visit. While the remaining case managers are not co-located in clinics with physicians, these community-based case managers engage physicians in their offices regularly, in addition to attending patient appointments. Many of the community-based case managers also had ties with some of these physicians prior to the demonstration. For example, one program case manager working with private-practice physicians had close ties to the medical staff attending the local hospital, having worked there prior to the demonstration.

Mercy also asks physicians to provide case managers with standing orders; that is, to allow case managers to change the dosage of physician-prescribed medications under specified circumstances (for example, increase dosage of a prescribed diuretic when a patient experiences fluid retention). Staff report that roughly half the physicians they work with provide these standing orders.

Efforts to engage physicians appear to have succeeded within the program's expectations. Physicians have cooperated in identifying those of their patients who are appropriate for the program and have not raised barriers to program implementation. The program's medical director has not had to handle any disagreements between case managers and physicians. Some physicians were initially disappointed when one of their patients was assigned to the control group, especially when they thought the patient really needed the intervention; but randomization did not prevent these physicians from participating in the program or referring more patients.

Improving Practice. The program seeks to improve physician practice by increasing physicians' understanding of the value of case management in their practice. The program intends to meet this goal by showing physicians that patient health improves and patients take less of their time to care for when they receive case management. Case managers do sometimes ask physicians questions about treatment or suggest medications. One case manager said she checks to see whether physicians are using guidelines for her CHF patients. However, case managers do not routinely review physicians' treatment for adherence to guidelines. The program's "rule of thumb" when it comes to gaining acceptance of case managers by physicians is that the physician is in charge of patient care. One case manager said that in order to establish rapport, "You have to prove yourself to the doctor by being a good advocate, independent thinker, and problem solver." Getting physicians to see the benefit of case management to their practice, therefore, is dependent on the case manager's ability to adapt to the physician's personal style.

Program staff believed they had achieved success in developing rapport between the case managers and physicians and that physicians were accepting of, and satisfied with, case management. "If they see a difficult, time-consuming patient, they know to call us." Although the program has not surveyed physicians about their satisfaction with the program, anecdotally

staff report that physicians view case management as an important resource. A case manager told us that one physician was very pleased with how the program had been able to decrease blood sugars for his diabetic patient in such a short time. "He had tried for 14 years to do what we accomplished in just a few months!" Another physician commented that his patient would not have to make appointments as often because his patient was in the program.

HOW WELL IS THE PROGRAM IMPLEMENTING KEY INTERVENTION APPROACHES?

Improving communication and coordination among patients and their physicians is the primary approach the Mercy CMDP is taking to improve patient health. It supports this approach by teaching patients how to coordinate their own care and communicate with their physicians. Teaching patients how to adhere to treatment recommendations is an important related goal.

Improving Communication and Coordination. Improving communication between patients and physicians, and making care less fragmented and more timely, is a fundamental component of the Mercy CMDP. The program's primary strategy to support this approach is to teach patients (1) how to manage their health better and coordinate their own care (for example, how to recognize symptoms and determine when it is appropriate to schedule a doctor's appointment); and (2) how to be more proactive in articulating their concerns and needs to their primary care physicians. The assessment and routine home visits provide the case manager with an opportunity to assess the patient's independence and communication skills. For example, if the case manager notices that the patient is having trouble making an appointment with his or her physician, the case manager will sit with the patient while he or she makes the call. Case managers may also help patients make a list of questions to ask their physician during appointments. The program also tries to facilitate communication between patients and

physicians by giving every patient a medication card listing the patient's current regimen to take with them to doctor's visits. Case managers assess whether communication is improving by observing how often and quickly patients call them when symptoms arise or whether patients call their physician. For example, patients have communicated appropriately when they call the case manager or physician's office when symptoms begin instead of immediately going to the emergency room.

If a patient is having difficulty communicating with his or her physician, case managers will intervene on behalf of the patient. For example, some patients who have had bad experiences with health care providers are reluctant to make doctor's appointments for themselves even when they need to. In these cases, the case manager will make the appointment for the patient, make sure he or she has transportation, and remind the patient to go. Case managers remarked that sometimes all these patients need is to have a good experience with a provider to initiate communication.

Communication between case managers and physicians is primarily informal. Clinic-based case managers see physicians in the course of daily practice, while community-based case managers visit the physician practices they serve or communicate with physicians by telephone. Case managers generally contact physicians when a patient's condition changes. Sometimes a case manager will use the CMIS to generate a progress note for the physician communicating the patient's change in status using a provider communiqué form (see Appendix C). Physicians may return this form to provide case managers with medication orders or call case managers directly to discuss the patient. Physicians and case managers may also communicate when case managers accompany patients to medical appointments.

Mercy seeks to better coordinate patient care in a number of ways. One of the program's approaches to improving care coordination is having case managers present all new patients to a

multi-disciplinary team. These monthly meetings (called "grand rounds" by the program) include the program director, medical director, social worker, chaplain, case managers, and other Mercy-affiliated personnel (for example, the MMC/NI hospice director and a home care representative). Discussion during grand rounds helps case managers develop their care plans for new enrollees. The program also uses grand rounds as an opportunity for case managers to brainstorm about particularly difficult patients and those who have just experienced adverse events.

Case managers also aim to improve coordination by making sure patients receive timely and appropriate diagnostic tests, and that test results are available to physicians during patient visits. For example, a patient called her case manager when the cardiac laboratory phoned her to tell her that her test result was abnormal. The case manager called the laboratory to have the result sent to the patient's primary care physician, then double-checked with the physician's office to ensure receipt of the test results. In this case, it was fortunate that the case manager followed up with the physician's office because the laboratory had sent the results to the wrong doctor.

Mercy further aims to make patient care more coordinated by finding out when adverse events occur, determining how to avoid repeat occurrences, and communicating their occurrence to physicians. Case managers learn about patients' adverse events either from patients themselves or through daily review of emergency room admissions to Mercy hospitals. The program's office manager reviews these records and reports any admissions to patients' assigned case managers. When an adverse event occurs, the case manager will work with the patient and his or her family or caregiver to identify what triggered the event and what can be done to prevent or minimize future occurrences. If the case is particularly difficult, the case manager may seek out the advice of the multi-disciplinary team. The case manager will also contact the physician, either by phone or by sending the physician a progress note, to learn whether the

patient's treatment will change. Case managers follow up with the hospital discharge planner to ensure the patient receives appropriate care after being released from the hospital.

Improving Patient Adherence. Improving patient (and family or caregiver) adherence to treatment recommendations is a key goal that the Mercy CMDP seeks to achieve as a means of improving patient health. Case managers provide patients with education designed to improve patients' self-management skills, disease-specific knowledge, and the relationship between lifestyle and disease. The education intervention is customized to patients' individual needs and is focused on patients' primary diagnosis; but education also addresses their comorbidities.

The case manager uses the assessment to identify educational needs and develop individualized educational approaches, although no specific instrument is used to determine educational needs. The program has educational pamphlets on each target condition; a self-monitoring diary for diabetics; nutritional recommendations and meal planning guidelines; "tip lists" for managing weight; and instructions on using an inhaler. Patients are given copies of these tools in an education packet tailored to their needs (that is, their primary diagnosis and lifestyle issues).[17] Case managers follow an established, disease-specific curriculum and sometimes refer patients to disease-specific education classes given by MMC/NI (for example, CHF self-care). Each case manager provides education in the following general areas to promote better self-management: (1) disease overview, (2) psychosocial issues, (3) nutrition, (4) activity/exercise, (5) medication, (6) self-monitoring, (7) signs and symptoms, and (8) lifestyle changes. Care managers also have disease-specific education checklists which they used to track

[17]The materials are available in other languages through MMC/NI's Regional Health Education Center, although none of the program's patients are non-English speakers, nor are any of the case managers bilingual.

patient progress in attaining educational goals in these eight core areas (see Appendix C for the education checklist for chronic renal failure).

Case managers determine whether education has been effective by determining whether a patient's self-management skills have improved. To make this determination, case managers observe the patient's behavior or environment. For example, a case manager might examine a patient's kitchen cabinets and refrigerator to see what kinds of foods the patient has been eating. The case manager might also check the patient's medication box to see if the patient has been taking medication as prescribed. In addition to direct observation, case managers ask their patients about their behaviors (for example, What did you eat today?) and ask them what they would do in hypothetical situations to observe their troubleshooting skills (for example, What would you do if you were feeling short of breath?). For 10 CHF patients, the Tel-Assurance device allows case managers to determine whether teaching has been effective. If the number of alerts issued by the system decreases, this indicates to the program that the patient's ability to manage his or her symptoms has improved and, thus, that education has been successful.

If the program finds a patient is not learning, the case manager continues to reinforce educational concepts, sometimes changing his or her approach. For difficult cases, the case manager may consult the multi-disciplinary team during grand rounds. If patients persistently have difficulty with self-management despite this process, the case manager considers bringing in support services, such as home health care.

The program serves a number of visually impaired or cognitively deficient patients, as well as those with low literacy, and makes special accommodations for these patients when educating them. Case managers go over written materials in person, making sure that the patient understands a topic before moving on to the next one. For the visually impaired, the program uses a lot of large-print materials, and case managers write patients' instructions using a magic

marker. For patients with cognitive problems, the case manager will educate both the caregiver and the patient. Case managers will also leave reminders for the patient. For example, case managers will write doctor's appointments on calendars and leave notes on the patient's refrigerator.

Among the 159 patients enrolled in the CMDP during its first six months, the majority had received at least one contact for self-care or disease-specific education (83 percent of patients), and almost half had at least one contact during which the case manager explained medications (48 percent). Fewer patients (12 percent) had at least one contact during which the case manager explained tests or procedures (Table 1).

Increasing Access to Services. Although the Mercy CMDP refers patients to a wide variety of services (or, if necessary, arranges services on their behalf), increasing access to services is not a major focus of the program. The services to which staff had referred patients most frequently at the time of our visit were transportation and personal care (including homemakers, companions, and respite care). Transportation, in particular, has been in short supply in some areas served by the program. Case managers also regularly refer patients to services, such as meals and food sources, home health care, housing resources, and spiritual care. The program also distributes senior citizens resource guides to patients that are tailored to their county of residence.

Case managers may assist patients with applying for public programs or other benefits and help them identify all the options available to them when their financial circumstances change. For example, when one patient had a stroke, her husband could no longer work outside their home or socialize because his wife needed full-time care. The program's social worker referred the patient's husband to Veterans Affairs for a pension that would supplement their income so he could stay home and care for his wife. The social worker also referred the wife to an adult day

care center and personal care services so that her husband could socialize and run errands. The assistance rendered by the program lessened the burden of chronic illness on the caregiver, enabling him to be more independent and avoid problems that could affect the care of his wife.

The cost of prescription medications has been an adherence barrier for some program patients, so the program tries to eliminate this barrier by helping patients find and apply for medication assistance programs. For example, one patient with COPD and hypertension had difficulty affording the nine medications he was taking because most of his financial resources were being used to care for his son with acute lymphocytic leukemia. The case manager referred the case to the program's social worker who helped the patient apply for a medication assistance program through pharmaceutical companies.

Although the program does not pay for goods or services, it does pay for Tel-Assurance home monitoring for some patients. During its first six months of operation, it purchased home monitoring equipment for only 1 of the 159 patients enrolled (data not shown). In addition, case managers referred a small number (5 percent) of patients to Medicare-covered services or arranged services for them. However, case managers referred 87 percent of patients to non-Medicare-covered services (Table 1).

WHAT WERE ENROLLEES' MEDICARE SERVICE USE AND COSTS?

This report provides preliminary estimates of the effect of the Mercy CMDP 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.

Total Medicare Part A and B reimbursements for the treatment group, exclusive of demonstration payment, were $1,899, on average, during the first two months after enrollment, compared with $2,606 for the control group (Table 4). This treatment-control difference of $708, or 27 percent, is not statistically significant. The difference is due primarily to the treatment group's lower hospital use, which is also not statistically significant.[18] While these findings are promising, the early cohort and short followup raise the question of whether this is truly a sustainable program effect. Program-induced reductions in hospital use may well occur only after a patient has been enrolled for several months and the program has had time to affect his or her behavior and health. In addition, the Medicare reimbursements for treatment group members increase by $454 when one takes into account the per-member per-month program payment to the CMDP over the first two months (or $227 per month).[19] Thus, total treatment group costs per beneficiary are only $254 less than control group cost over the two-month followup.

We also examined monthly trends in treatment-control differences from April through September 2002, the first six months of program operation (Table 5). The sample enrolled each month is only large enough (at least 50 patients in each group) to draw inferences over the last four months. In each of these months, the treatment group incurred lower Medicare expenditures than the control group and had fewer hospitalizations. Only one of the differences is statistically

[18]As would be expected with random assignment, the treatment and control groups were statistically similar. Thus, these post-enrollment differences in Medicare service use and costs do not appear to be due to preexisting differences in the two groups. (See Appendix B.)

[19]The per-member, per-month fee charged by the program is $257, or $514 over the two-month period. The slightly lower means 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 (percentage)	10.5	13.8	–3.3	
Number of admissions	0.11	0.17	–0.06	
Number of hospital days	0.56	0.88	–0.33	
Emergency Room Services				
Any emergency room encounters (percentage)				
Resulting in admission	1.1	1.1	0.0	
Not resulting in admission	10.5	9.6	1.0	
Total	11.6	10.6	0.9	
Number of emergency room encounters				
Resulting in admission	0.01	0.01	0.00	
Not resulting in admission	0.20	0.10	0.10	
Total	0.21	0.11	0.10	
Skilled Nursing Facility Services				
Any admission (percentage)	3.2	1.1	2.1	
Number of admissions	0.04	0.01	0.03	
Number of days	0.63	0.09	0.55	
Hospice Services				
Any admission (percentage)	2.1	1.1	1.0	
Number of days	0.04	0.04	0.00	
Home Health Services				
Any use (percentage)	6.3	8.5	–2.2	
Number of visits	0.73	0.50	0.23	
Outpatient Hospital Services[b]				
Any use (percentage)	77.9	71.3	6.6	
Physician and Other Part B Services[c]				
Any use (percentage)	90.5	84.0	6.5	
Number of visits or claims	5.2	6.1	–0.9	
Mortality Rate (percentage)	2.1	1.1	1.0	
Total Medicare Reimbursement[d]				
Part A[e]	$742	$1,564	–$822	
Part B	$1,157	$1,042	$114	
Total	$1,899	$2,606	–$708	
Reimbursement for Care Coordination[f]	$454	$0	$454	***
Number of Beneficiaries	**96**	**94**		

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.

[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 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.

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	15	40	64	84	106	130
	Control	14	41	67	83	107	127
Number of Beneficiaries Enrolled Who Meet Medicare Coverage and Payer Requirements and Are Alive That Month	Treatment	15	40	64	81	102	126
	Control	13	40	66	80	104	124
Average Medicare Reimbursement During the Month[a]	Treatment	$959	$1,270	$1,033	$1,238	$914	$735
	Control	$594	$725	$1,476	$1,335	$1,324	$1,445
Average Reimbursement for Care Coordination During the Month[a,b]	Treatment	$69	$225	$205	$225	$232	$234
Whether Admitted to Hospital This Month[a] (Percentage)	Treatment	0.0	7.5	7.8	8.6	5.9	3.2
	Control	0.0	7.5	9.1	10.0	8.7	7.3
Treatment - Control Difference[c]							
Average Medicare Reimbursement[a]		$365	$545	–$443	–$97	–$410	–$710 *
Average Reimbursement for Medicare plus Care Coordination[a]		$434	$770	–$238	$128	–$178	–$476
Percentage Hospitalized[a]		0.0	0.0	–1.3	–1.4	–2.8	–4.1

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.

TABLE 5 *(continued)*

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[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.

[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.

significant at the 10 percent level. It is too soon to tell whether these early differences in hospitalization and Medicare expenditures are true program effects and will remain with larger numbers of patients and more follow-up time.

CONCLUSION

Research over the past decade suggests, but is by no means conclusive, that successful care coordination has a number of 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 (Chen et al. 2000); 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, to address the complexities posed by patients with several comorbid conditions, and, when necessary, to arrange 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 f 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 help to 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. The Mercy CMDP appears to have almost all the features associated with effective care coordination.

- The program ***targets patients with high health care costs*** and uses searchable databases at participating hospitals to identify potential participants. Once eligible patients are identified, physicians must review them for program appropriateness and sign letters inviting patients to participate. The program met its year-one enrollment target. Moreover, the program has enrolled patients who are more likely to have a number of chronic conditions and who have higher Medicare expenditures than eligible beneficiaries in its service area who did not enroll.
- The program administers a ***comprehensive, in-person assessment*** that includes an evaluation of the patient's self-care skills and barriers to treatment adherence. Case managers develop assessment-based care plans using template care plans individualized to a patient's primary diagnosis and their own goals. Physicians must approve and sign the care plans.
- The program ***monitors patients' progress*** in meeting care plan goals primarily with regular home visits or telephone calls. Case managers evaluate patient activities and

knowledge during each contact and compare them with care plan goals, as well as the patient's need for services.

- Case managers must be ***baccalaureate-prepared or advanced practice nurses***. The program provides each case manager with extensive case management training. The program director formally evaluates case manager performance on an annual basis.

- Mercy ***facilitates collaboration between case managers and physicians*** by placing some of its case managers in clinics with the physicians and visiting other physicians' practices on a periodic basis. The program also asks physicians to give case managers "standing orders" (that is, permission to change the dosage of prescribed medications under specified circumstances).

- The program seeks to get physician involvement and cooperation by demonstrating the ***value of case management to physicians,*** rather than by trying to change provider practice. Although case managers might ask physicians questions about a patient's treatment or suggest medications, the physician is in charge of patient care. Anecdotal evidence suggests that physicians are beginning to see the benefits of case management.

- Case managers reduce care fragmentation and facilitate communication in a number of ways. They ***teach patients to be better self-managers*** and communicate better with their physician. Case managers will schedule doctor's appointments for patients when they are unable or unwilling to do so. Case managers ***send physicians progress notes or call them*** when a change in patient status occurs. Case managers present all new patients, difficult patients, and patients who have just experienced adverse events to a multi-disciplinary team during weekly "grand rounds."

- The program's education intervention is based on a single, flexible ***curriculum that can be tailored to each patients' specific needs***, focusing on their primary diagnosis but also comorbidities. The program also has special materials and support structures for addressing the needs of patients with visual impairments or cognitive deficits. The program assesses teaching effectiveness by repeating parts of the assessment tool and asking about or observing patient behavior. If a patient is not learning, the case manager will continue to ***reinforce educational concepts*** or revise the approach.

- The program arranges for a number of support services and resources, and provides patients with ***assistance in applying for public programs*** and benefits, such as medication assistance programs. The program distributes county-specific resource guides to patients. The program does not pay for goods and services, although it does provide home monitoring devices for a limited number of CHF patients. The program also has a social worker and chaplain on staff to facilitate patient referrals to appropriate services and resources.

- Case managers have a ***financial incentive to meet program-wide objectives***. Group objectives are set annually in several areas, including enhancing customer service, valuing colleagues, managing costs, improving quality, improving access, and growing strategically. The program does not provide financial incentives to physicians or pay them for their participation.

Potential Barriers to Program Success. The Mercy CMDP program design contains no obvious barriers to success. However, until recently, the program lacked a process for generating regular reports for reviewing outcomes (for example, clinical indicators, adverse events, and health care utilization) other than enrollment statistics. Mercy is currently developing its first annual report, which will include some patient outcomes, financial statistics, and enrollment statistics. More regular reporting of a broad set of patient outcomes would provide program administrators with timely feedback about whether the intervention is meeting its objectives, thus enabling the program to improve its performance. Mercy's CMIS has the capacity to generate such reports, since it tracks almost all program data.

Finally, the results for the first six months suggest that the program may reduce hospitalizations and overall Medicare costs. While these early treatment-control differences on a small sample are not statistically significant, the lower hospital admissions rate for the treatment group suggests that Mercy may be able to reduce Medicare costs. Whether these differences are due to the program or to chance, and whether they are large enough to cover the program's care coordination fees, cannot be assessed without data on more patients over a longer time period than was available here.

Plans for the Second Site-Specific Report. Over the first two years of operation, a second report on MCCD activities will be prepared, which will focus more heavily on program impacts, estimated from both survey and Medicare claims data. This report, due in mid-2005, will describe changes made to the program over time and the reasons for those changes, as well as staff impressions of the program's successes and shortcomings.

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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, Dade, and Palm Beach 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

MMC/NI Medicare Care Coordination Demonstration proposal (submitted to the Centers for Medicare and Medicaid Services dated October 6, 2000)

MMC/NI Medicare Care Coordination Demonstration Quarterly Report (submitted to the Centers for Medicare and Medicaid Services dated January 31, 2003)

Senior Citizens Resource Guides for Kossuth and Wright counties (dated September 2000) and Cerro Gordo, Floyd, Franklin, and Hancock counties (dated January 2002)

Assorted educational materials, including case manager checklists, pamphlets, and tip sheets (undated)

Standardized care plans for atherosclerosis, heart failure, chronic obstructive pulmonary disease, chronic renal failure, and cerebrovascular accident (undated)

Updated assessment, care plan, and encounter forms (received November 27, 2003)

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

We measured the proportion and types of beneficiaries attracted to the program 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, April 19, 2002 through October 15, 2002. We then explored patterns of participation by comparing eligible participants and eligible nonparticipants, noting how they differed on demographics, the reason for Medicare eligibility, and the costs and use of key Medicare services over the previous two years.

1. Approximating Program Eligibility Criteria

We began by identifying the program's eligibility criteria, reflecting CMS's insurance coverage and payer criteria for all programs and Mercy Medical Center North Iowa's (Mercy) specific criteria. CMS excluded beneficiaries from the demonstration who were not at risk for incurring full costs in the fee-for-service (FFS) 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 the Medicare coverage and payer requirements, Mercy 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 considered for Mercy's demonstration, beneficiaries must have had a hospital admission or emergency room visit for

TABLE B.1

ELIGIBILITY CRITERIA

Inclusion Criteria	Inpatient admission or emergency room treatment for CHF, COPD, Chronic Lung Disease, Stroke, Vascular Disease, Renal Failure, or Liver Disease. (No time frame specified by Mercy for when these encounters had to occur. We use the last two years.) Codes: 402.01, 402.11, 402.91, 428.0, 428.1, 428.9, 571.0 - 571.9, 491.0, 491.1, 491.20, 491.21, 491.8, 491.9, 492.0, 492.8, 494.0, 515, 714.81, 518.83, 518.89, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 436, 496, 585 - 586, 440, 440.0, 440.1, 440.2, 440.20, 440.21, 440.22, 440.23, 440.24, 440.29, 443.9, 459.9
Exclusion Criteria	Patients will be excluded if they meet any of the following criteria: 1. ESRD patients who have Medicare as primary insurance only because of their renal disease 2. Hospice Medicare Benefit 3. Long-term placement in skilled or intermediate care facilities
Providers/Referral Sources	Mercy Medical Center of North Iowa hospital, Mercy Medical Center, N.I. Network hospitals or clinics
Geographic location	Counties in Iowa: Butler, Cerro Gordo, Chickasaw, Floyd, Franklin, Hancock, Hardin, Howard, Humboldt, Kossuth, Mitchell, Palo Alto, Winnebago, Worth, and Wright

congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), chronic lung disease, stroke, vascular disease, renal failure, or liver disease. Mercy does not specify a time frame over which these encounters had to occur in order for a patient to be eligible. Along with meeting the diagnosis criteria, at the time of enrollment beneficiaries could not (1) have end-stage renal disease (ESRD) listed as their current reason for entitlement to Medicare, (2) be receiving Medicare's hospice benefit, or (3) live in a nursing home or long-term care facility.

We could approximate most of Mercy's criteria using Medicare data with some exceptions. We implemented Mercy's requirement that a patient must have *ever* had a hospital admission or emergency room visit for one of the target conditions by examining whether a beneficiary had an inpatient or outpatient hospital claim for such an encounter at any point during the 30-month period beginning May 1, 2000—two years before enrollment began—and ending six months after enrollment started (October 31, 2002). Using outpatient claims, which includes outpatient hospital claims as well as emergency room visits, may overstate the number of eligible nonparticipants in the program's catchment area and thus understate the participation rate slightly. We used the same time period to approximate whether beneficiaries met the program's medical exclusion criteria at the time of enrollment. We were unable to observe the complete diagnostic history for beneficiaries who had not been in FFS Medicare during the full two years before the six-month enrollment window.[1] We also could not fully approximate one of Mercy's exclusion criteria using Medicare data: excluding those beneficiaries who lived in a nursing home or long-term care facility.

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

We used Medicare claims and eligibility data and data submitted by the program to identify participants and eligible nonparticipants. For all participants, we used the Medicare enrollment database (EDB) file to confirm the HIC number, name, and date of birth submitted by the program when beneficiaries were randomized. We identified potentially eligible nonparticipants by identifying the HIC numbers of all Medicare beneficiaries who were alive and living in the

[1]Among the 303 beneficiaries who enrolled in the first six months, had valid HIC numbers reported, and met CMS's insurance requirements, 1.32 percent were enrolled in Medicare FFS 12 or fewer of the previous 24 months before they enrolled in the demonstration; 0.99 percent of participants were in FFS fewer than 6 of the 24 months before enrolling.

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, and obtain eligibility information from the EDB. Using this information, we limited the sample 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 we obtained all possible HIC numbers the beneficiary may have been assigned. This was done using Leg 1 of CMS's Decision Support Access Facility. At the end of this step, we had a list of HIC numbers for all participants, as well as all beneficiaries living in the catchment area during the six-month enrollment period.

3. Creating Variables from Enrollment and Claims Data

We obtained eligibility information from the EDB and diagnostic and utilization data from the National Claims History (NCH). 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 we examined—October 2002—and the appearance of the claim on the Medicare files.[2]

[2]Occasionally, the HIC number in the cross-reference file was not in the EDB file that we 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-

Medicare claims and eligibility information were summarized as monthly variables from May 2000 through October 2002, for a total of 30 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.

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, and 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 (DME) reimbursements were counted in other Part B reimbursement. A small number of negative values for total Part A and Part B reimbursements during the past two years occurred for some of

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(continued)
reference file using the unloaded version of the EDB, which was updated quarterly. We extracted data using the production version of the EDB, which was updated every night.

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

4. Defining Eligible Nonparticipants and Eligible Participants

We used target criteria information to pare down the group of beneficiaries who lived in the catchment area to those who met the program's eligibility criteria that we could measure 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 46,230 beneficiaries who lived in the 15 counties in Mercy's catchment area at some point during the first six months of enrollment (Table B.2). We then excluded 3,210 people (6.9 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 27,340 of the remaining people (59.1 percent of all area beneficiaries) were dropped from the sample, since they were not treated for one or more of the target diagnoses that the program identified as necessary for inclusion during the two years before the program began or the first six months of enrollment. Twenty-two percent of the remaining 15,680 beneficiaries (3,500 people) did not meet the utilization requirements we measured (hospital stay or outpatient hospital claim) during the 30 months from May 2000 through October 2002 (which includes the year before the program began, as well as the six-month enrollment window). Finally, 557 people were identified as having at least one of Mercy's exclusion criteria,

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	46,230
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	–3,210
Did not have one or more of the target diagnoses on any claim during the two years before the program started or during the six-month enrollment window	–27,340
Did not meet the inpatient or outpatient hospital utilization criteria during the 30 months from May 2000 through October 2002	–3,500
Met at least one of the exclusion criteria during the 30 months from May 2000 through October 2002	–557
Eligible Sample	**11,623**

leaving us with a sample of 11,623 beneficiaries in the 15 counties we estimated would have been eligible to participate in Mercy's program.

Mercy randomized 322 beneficiaries who enrolled in the demonstration program during the first six months of operation (Table B.3). Of these, 15 people (about 5 percent) could not be matched to their Medicare claims data due to problems with their reported HIC numbers and

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	165	157	322
Minus Those Who:			
Had an invalid HIC number on MPR's enrollment file	–7	–8	–15
Not in geographic catchment area during the month of intake	–3	–2	–5
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	–1	–2	–3
Did not have one or more of the target diagnoses on any claim during the two years before the program started or during the six-month enrollment window	–0	–3	–3
Did not meet the inpatient or outpatient hospital utilization criteria during the 30 months from May 2000 through October 2002	–3	–1	–4
Met at least one of the exclusion criteria during the 30 months from May 2000 through October 2002	–1	–0	–1
Eligible Sample	**150**	**141**	**291**

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).

were therefore excluded from the participation sample.[3] Mercy randomized five beneficiaries who had an address on the EDB that was outside its catchment area. We excluded these cases from the participation analysis to maintain comparability to the eligible nonparticipant sample. We also excluded the participants who did not meet CMS's insurance requirements for participation in the program during the month of intake. We also dropped three beneficiaries for not having at least one claim for a target diagnosis during the two years before the program began or the first six months of the program, and four beneficiaries for not meeting the utilization criteria during the 30-month period, May 2000 through October 2002. Finally, one participant was dropped from the participation analysis because the participant met one of the program's exclusion criteria during the same 30-month period. Thus, among the 322 participants randomized by Mercy into the program during its first six months of operations, after exclusions, 291 people are included in the participation analyses as eligible participants.

Mercy's participation rate for the first six months of enrollment is therefore calculated as the number of participants who met the eligibility requirements (291), divided by the number of eligibles who live in the catchment area (11,623), or 2.5 percent.

Table B.4 describes the characteristics of the 291 participants who were enrolled by Mercy during the first six months and appear to meet Mercy's eligibility requirements, as measured in Medicare data, and the 11,332 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

[3]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 3). 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.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)	76.8	77.7	
Younger than 65	4.5	5.1	
65 to 74	32.3	30.4	
75 to 84	48.1	40.9	**
85 or older	15.1	23.6	***
Male	56.7	45.9	***
Nonwhite	0.3	0.6	
Original Reason for Medicare: Disabled or ESRD	14.8	12.4	
State Buy-In for Medicare Part A or B	12.4	16.7	**
Newly Eligible for Medicare (Eligible Less than Six Months)	0.7	0.0	***
Enrolled in Fee-for-Service Medicare 6 or More Months During Two Years Before Intake	99.0	99.8	***
Medical Conditions Treated During Two Years Before Month of Intake[b]			
Coronary artery disease	69.4	46.7	***
Congestive heart failure	67.4	42.3	***
Stroke	31.6	27.6	
Diabetes	38.2	27.1	***
Cancer	27.8	21.5	**
Chronic obstructive pulmonary disease	61.1	45.1	***
Dementia (including Alzheimer's disease)	3.8	5.5	
Peripheral vascular disease	24.0	20.6	
Renal disease	20.5	10.3	***
Total Number of Diagnoses	3.4	2.5	***
Days Between Last Hospital Discharge and Intake Date[b]			
0 to 30	7.3	4.0	***
31 to 60	6.9	3.8	***
61 to 180	26.0	13.5	***
181 to 365	27.1	13.4	***
366 to 730	24.7	18.1	***
No hospitalization in past two years	8.0	47.3	***

TABLE B.4 *(continued)*

	Eligible Demonstration Participants (Treatments and Controls)[a]	Eligible Nonparticipants	
0	8.0	47.6	***
0.1 to 1.0	59.0	38.5	***
1.1 to 2.0	25.4	10.0	***
2.1 to 3.0	5.9	2.9	***
3.1 or more	1.7	1.1	
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[b]			
Part A	$716	$349	***
Part B	$522	$261	***
Total	$1,238	$610	***
Distribution of Total Medicare Reimbursement per Month Fee-for-Service During One Year Before Intake[b]			
$0	0.0	0.6	
$1 to 500	35.4	68.2	***
$501 to 1,000	24.3	12.7	***
$1,001 to 2,000	21.2	11.0	***
More than $2,000	19.1	7.6	***
Number of Beneficiaries	**291**	**11,332**	

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 Medicare coverage and payer 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.

[c]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). 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.

eligibility criteria according to Medicare claims data. Because more than 95 percent of the participants are included in this table, the results are similar to those in Table 2.[4]

B. METHOD FOR CALCULATING TREATMENT-CONTROL DIFFERENCES

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

1. Treatment-Control Differences

We used two approaches to estimate treatment-control differences in Medicare-covered service use and cost outcomes. First, we estimated differences over a two-month follow-up period for all the people Mercy randomized during the first four months of enrollment. The four-month enrollment window covers April 19, 2002 through August 16, 2002—the follow-up time that covers the two calendar months after the month of randomization. For example, for a beneficiary randomized on May 25, we examined outcomes in June and July.

[4]Nonparticipants were identified as eligible if they met the target criteria anytime during the six-month enrollment window, as well as the two years before the window. When we calculated pre-enrollment 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, we estimated treatment-control differences by calendar month over the first six months of Mercy'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, patients to adopt case managers' recommendations, and 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 Mercy'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 he or she is eligible and alive in each month.[5] Someone randomized in May would not be part of the calculations for April but would be included in May through September, again, provided that person is eligible in 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 who enrolled but were ineligible for the demonstration according to CMS's insurance criteria (as determined from data on the EDB). However, we also excluded beneficiaries flagged as a household member of a participant, since they were not part of the research sample and thus were not used for the outcomes analysis.[6]

[5]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).

[6]To keep the two groups balanced, household members were excluded from treatment-control comparisons. Household members were assigned to the same experimental status 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

Also, in contrast to the participation analyses, participants who did not meet the program's target criteria, according to the claims and EDB data, were not excluded from the outcomes analyses. Given this, of the 204 people randomized in the first four months of Mercy's demonstration, the sample for analyzing treatment-control differences contained 190 people. For the six-month sample, 297, or 92 percent of the 322 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 FFS (described in footnote 7).

TABLE B.5

SAMPLES FOR TREATMENT-CONTROL COMPARISONS

	First Four Months	First Six Months
Number of Beneficiaries Who Were Randomized	204	322
Minus Those Who:		
Were members of the same household as research sample members	–3	–6
Had invalid HIC numbers on MPR's enrollment file	–8	–15
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	–3	–4
Number of usable sample members	**190**	**297**

(continued)

members in the control group than in the treatment group, because 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.

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, we used two-tailed t-tests and chi-squared tests to compare the two research groups. Table B.6 presents the baseline characteristics for both the four-month and the six-month sample.

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 differences in three baseline characteristics for the four-month sample: (1) the proportion of beneficiaries who were treated for COPD in the two previous years, (2) the proportion of beneficiaries who were treated for renal disease in the two previous years, and (3) the proportion of beneficiaries in 2 of the 15 counties in the catchment area. For the six-month sample, there were also three statistically significant differences: (1) the proportion of beneficiaries who had been enrolled in Medicare six or more months during the two years before intake, (2) the proportion of beneficiaries who were treated for diabetes in the two previous years, and (3) the proportion of beneficiaries in 5 of the 15 counties in the catchment area. We would expect this number of false-positive differences to occur by chance, given the number of characteristics examined. Thus, none of the differences in this fairly small, early sample create any cause for concern.

3. Sensitivity Tests

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

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)	77.5	76.1		76.8	77.3	76.4		76.9
Younger than 65	3.1	4.3		3.7	4.0	5.5		4.7
65 to 74	32.3	36.2		34.2	33.1	30.1		31.6
75 to 84	46.9	47.9		47.4	46.4	50.7		48.5
85 or older	17.7	11.7		14.7	16.6	13.7		15.2
Male	58.3	63.8		61.1	54.3	58.9		56.6
Nonwhite	1.0	0.0		0.5	0.7	0.0		0.3
Original Reason for Medicare: Disabled or ESRD	16.7	12.8		14.7	17.2	13.7		15.5
State Buy-In for Medicare Part A or B	15.6	11.7		13.7	13.9	11.0		12.5
Newly Eligible for Medicare (Eligible Less than Six Months)	2.1	0.0		1.1	1.3	0.0		0.7
Enrolled in Fee-for-Service Medicare Six or More Months During Two Years Before Intake	97.9	100.0		98.9	98.0	100.0	*	99.0
Medical Conditions Treated During Two Years Before Month of Intake[a]								
Coronary artery disease	70.2	74.5		72.3	71.0	71.2		71.1
Congestive heart failure	67.0	64.9		66.0	68.9	65.8		67.3
Stroke	30.9	33.0		31.9	28.4	32.9		30.6
Diabetes	34.0	45.7		39.9	33.1	43.2	*	38.1
Cancer	25.5	24.5		25.0	27.0	27.4		27.2
Chronic obstructive pulmonary disease	68.1	48.9	***	58.5	64.2	55.5		59.9
Dementia (including Alzheimer's disease)	5.3	3.2		4.3	4.7	2.7		3.7
Peripheral vascular disease	24.5	29.8		27.1	21.6	26.7		24.1
Renal disease	29.8	17.0	**	23.4	23.0	17.1		20.1

TABLE B.6 *(continued)*

	Four-Month Sample			Six-Month Sample			
	Treatment Group	Control Group	Total Research Sample	Treatment Group	Control Group		Total Research Sample
Total Number of Diagnoses (number)	3.6	3.4	3.5	3.4	3.4		3.4
Days Between Last Hospital Discharge and Intake[a]							
0 to 30	8.5	5.3	6.9	8.8	6.2		7.5
31 to 60	5.3	10.6	8.0	5.4	8.9		7.1
61 to 180	22.3	19.2	20.7	27.0	25.3		26.2
181 to 365	21.3	27.7	24.5	25.0	28.8		26.9
366 to 730	33.0	28.7	30.9	25.7	22.6		24.1
No hospitalization in past two years	9.6	8.5	9.0	8.1	8.2		8.2
Annualized Number of Hospitalizations During Two Years Before Month of Intake[a,b]							
0	9.6	8.5	9.0	8.1	8.9		8.5
0.1 to 1.0	52.1	57.5	54.8	58.8	56.2		57.5
1.1 to 2.0	26.6	24.5	25.5	23.7	28.1		25.9
2.1 to 3.0	9.6	6.4	8.0	7.4	4.8		6.1
3.1 or more	2.1	3.2	2.7	2.0	2.1		2.0
Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[a]							
Part A	$799	$739	$769	$721	$740		$730
Part B	$570	$489	$529	$535	$505		$520
Total	$1,369	$1,228	$1,298	$1,256	$1,245		$1,251
Distribution of Total Medicare Reimbursement per Month in Fee-for-Service During One Year Before Intake[a]							
$0	0.0	0.0	0.0	0.0	0.0		0.0
$1 to 500	40.4	36.2	38.3	36.5	34.3		35.4
$501 to 1,000	19.2	23.4	21.3	25.0	23.3		24.1
$1,001 to 2,000	17.0	22.3	19.7	17.6	24.7		21.1
More than $2,000	23.4	18.1	20.7	21.0	17.8		19.4
Location During Program Intake Period							
Iowa							
Butler	0.0	2.1	1.1	0.7	3.4	*	2.0
Cerro	39.6	41.5	40.5	44.4	45.9		45.1
Chickasaw	0.0	3.2 *	1.6	0.0	2.1	*	1.0
Floyd	3.1	8.5	5.8	5.3	6.9		6.1
Franklin	12.5	6.4	9.5	11.9	4.8	**	8.4

TABLE B.6 *(continued)*

	Four-Month Sample				Six-Month Sample			
	Treatment Group	Control Group		Total Research Sample	Treatment Group	Control Group		Total Research Sample
Hancock	14.6	4.3	**	9.5	9.9	2.7	**	6.4
Hardin	0.0	0.0		0.0	0.0	0.0		0.0
Howard	0.0	0.0		0.0	0.0	0.0		0.0
Humboldt	1.0	0.0		0.5	0.7	0.0		0.3
Kossuth	12.5	11.7		12.1	8.6	10.3		9.4
Mitchell	5.2	5.3		5.3	6.0	6.9		6.4
Palo Alto	0.0	0.0		0.0	0.7	0.0		0.3
Winnebago	3.1	8.5		5.8	3.3	8.2	*	5.7
Worth	6.3	5.3		5.8	4.6	4.8		4.7
Wright	1.0	3.2		2.1	2.0	3.4		2.7
Outside catchment area	1.0	0.0		0.5	2.0	0.7		1.3
Number of Beneficiaries	**96**	**94**		**190**	**151**	**146**		**297**

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 were excluded from this table if they did not meet Medicare coverage and payer requirements for the demonstration, 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.

[a]Calculated among beneficiaries with six or more months in Medicare fee-for-service in the two years before intake.

[b]Calculated as 12 x (number of hospitalizations during two years before month of intake) / (number of months eligible). 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.

randomization date, we conducted a sensitivity analysis examining outcomes for three months—during the month the individual was randomized, as well as the two months after randomization (Table B.7). The results were similar to those for outcomes measured over the two-month period (text Table 5). 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 (percentage)	13.5	17.0	–3.5	
Number of admissions	0.17	0.23	–0.07	
Number of hospital days	0.75	1.21	–0.46	
Emergency Room Services				
Any emergency room encounters (percentage)				
Resulting in admission	1.0	1.1	0.0	
Not resulting in admission	15.6	12.8	2.9	
Total	16.7	13.8	2.8	
Number of emergency room encounters				
Resulting in admission	0.01	0.01	0.00	
Not resulting in admission	0.34	0.15	0.19	
Total	0.35	0.16	0.19	
Skilled Nursing Facility Services				
Any admission (percentage)	3.1	2.1	1.0	
Number of admissions	0.04	0.02	0.02	
Number of days	0.76	0.28	0.48	
Hospice Services				
Any admission (percentage)	3.1	1.1	2.1	
Number of days	0.05	0.04	0.01	
Home Health Services				
Any use (percentage)	10.4	11.7	–1.3	
Number of visits	1.39	0.83	0.56	
Outpatient Hospital Services[b]				
Any services (percentage)	92.7	86.2	6.5	
Physician and Other Part B Services[c]				
Any use (percentage)	97.9	92.6	5.4	*
Number of visits or claims	8.2	9.6	–1.4	
Mortality Rate (percentage)	3.1	1.1	2.1	
Total Medicare Reimbursement[d]				
Part A[e]	$1,205	$1,960	–$756	
Part B	$1,766	$1,574	$191	
Total	$2,970	$3,534	–$564	
Reimbursements for Care Coordination[f]	$616	$0	$616	***
Number of Beneficiaries	**96**	**94**		

TABLE B.7 *(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.

[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 DOCUMENTS

SELECTED PROGRAM DOCUMENTS

Patient recruitment letter

Telephone recruitment script

Program informational flyer (displayed in physician's offices)

Emergency plan form

Spiritual assessment form

Social worker referral form

Care planning form

Provider communiqué form

Education checklist for chronic renal failure