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Care management of patients with complex health care needs

See companion Policy Brief available at *www.policysynthesis.org*

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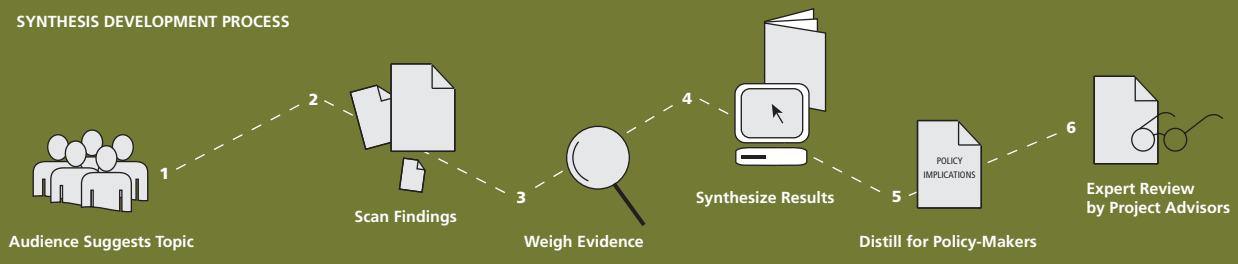
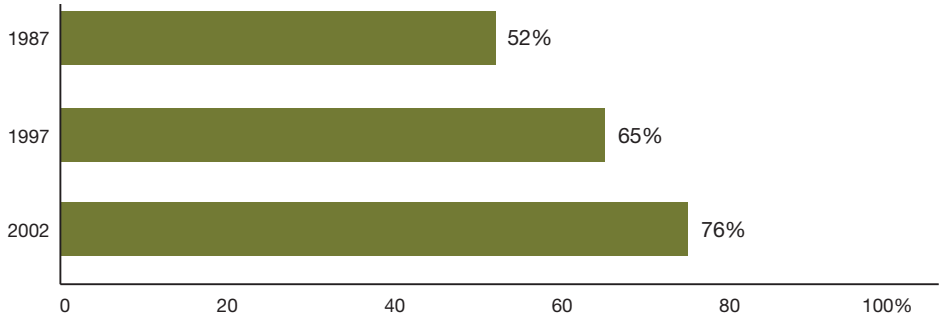


Introduction

A high percentage of health care expenditures are associated with a small proportion of the population – people with complex health care needs. Most patients in this high-cost group are Medicare beneficiaries with multiple chronic conditions, frequent hospitalizations, and limitations on their ability to perform basic daily functions due to physical, mental and psychosocial challenges.

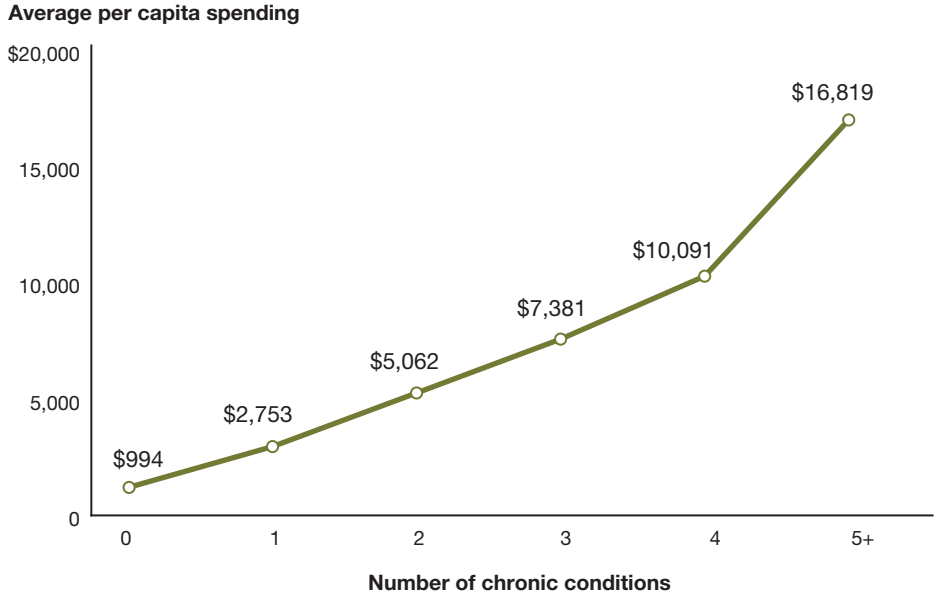
The growth in Medicare expenditures for beneficiaries with five or more chronic conditions is striking, jumping from 52 percent of total Medicare spending in 1987 to 76 percent in 2002 (Figure 1). Health care spending for people with five or more chronic conditions is 17 times higher than for people with no chronic conditions (Figure 2). Given the 73 percent projected growth in the next 10 years of the over-65 population and the far higher prevalence of complex health care needs among this group, the costs of providing care for this population sector threatens Medicare's future viability.

Figure 1. Medicare spending for beneficiaries with 5 or more conditions



Source: Thorpe and Howard (111)

Figure 2: Average per capita spending by number of chronic conditions



Source: Anderson (2)

Introduction

For patients with complex health care needs, the issues of cost and quality are intertwined. For example, patients experiencing quality of care problems are likely to have more hospitalizations due to complications associated with poor quality of care. Therefore, days spent in the hospital per year is both a cost measure and a quality measure. High-cost measures such as hospitalizations, emergency department care and nursing home stays also may indicate poorer quality of life. For example, elderly patients generally report a better quality of life if they can avoid hospitalization, remain in their homes, and visit their own physician's office for treatment.

Although complexity, vulnerability and age may not predispose older persons to receive poorer-quality care, several studies provide evidence that patients whose care requires time-consuming processes such as history taking, counseling, and medication-prescribing do experience inadequate quality of care. Min et al. (71) found that only about 30 percent of vulnerable older people receive adequate counseling and history taking. Simon et al. (101) found that 29 percent of elderly HMO patients receive at least one potentially inappropriate drug. Lin (2004) found that potentially harmful drug interactions occur in as many as 50 percent of patients taking over five medications a day. Moreover, patients with high medical costs tend to lack trust in their physicians and have more negative assessments of the quality of the care they receive (33).

The real-world experience of health care provider organizations supports the findings of a number of research studies, which suggest care management may be a delivery innovation that can reduce costs while enhancing the quality of care for people with complex health care needs. Care management is a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aim of improving patients' health status and reducing the need for medical services.

This synthesis looks at the evidence and explores the potential for care management to improve quality of care and reduce costs for people with complex health care needs. This synthesis addresses the following questions:

1. What is care management?
2. How are patients identified for care management programs?
3. Do research-based care management programs enhance quality and reduce costs for patients with complex health care needs?
4. What are the characteristics of successful care management programs?
5. How have research-based care management programs been adapted to real-world treatment settings?
6. How do payment policies influence the creation and success of care management programs?

People with complex health care needs are not a distinct category of patients; they are patients at the far end of a population-wide spectrum ranging from healthy individuals to people with serious medical problems and high utilization of health care services. This synthesis focuses on the most prevalent high-cost patients – those with multiple chronic conditions, many medications, multiple providers, frequent hospitalizations, and limitations on their ability to perform basic daily functions.

Methodology overview

Health services research on care management is difficult because care management interventions are operator-dependent, poorly standardized, of varying intensities, and have short follow-up periods. The patients enrolled in these studies may not be representative of real-world populations, the studies may not be applicable to different health care institutions, and the interventions may be more rigorously applied in a study situation than in the less controlled real world of medical practice. To try to bridge this gap, this synthesis reviewed the literature on care management for patients with complex health care needs and included interviews with leaders from health care organizations that have implemented programs for complex patients.

Literature prior to 1990 was excluded as was literature discussing single chronic conditions such as diabetes or asthma. A notable exception: The leading congestive heart failure care management studies were included because they were performed with heart failure patients who also had multiple comorbidities and frequent hospitalizations. Literature using a purely pre-post design with no controls and literature describing care management programs in nations other than the United States and Canada were also excluded. Additional detail on methodological issues can be found in Appendix II.

Findings

What is care management?

Care management is a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aim of improving patients' health status and reducing the need for medical services. The goals of care management are to improve patients' functional health status, enhance coordination of care, eliminate duplication of services, and reduce the need for expensive medical services (18).

Although both academic and commercial literature often use the terms "care management" and "case management" interchangeably, even within the same document, distinctions can be made. For example, case management often refers to a limited set of episodic services assisting patients and families in navigating the health care and social service systems with cost reduction as its primary goal. In contrast, care management is a broad set of longer-term services that includes medical management and assistance in navigating the system, with both quality enhancement and cost reduction as goals. Care management requires the involvement of professionals with clinical training, usually registered nurses (RNs).

Care management can also be contrasted with disease management and population management (Table 1). Disease management tends to target one disease, while care management focuses on individuals who often have multiple chronic conditions. Population management emphasizes care and prevention required to improve the health of populations rather than of individuals, which requires stratifying the population into different risk groups depending on disease severity and choosing the best approach for each risk group (115).

Table 1: Concepts of chronic disease management

Disease management	Focus on specific diseases
Care management	Focus on specific patients who often have multiple diseases
Population management	Focus on a large population of patients, risk-stratifying the population to determine the best approach to each risk subgroup

These terms are best understood through a historical trajectory. In the 1990s, chronic disease appeared on the radar screens of health policy experts. Two schools of thought emerged about how to improve care and reduce costs for this large population. One was primary-care-based, the other carved out disease management as a service separate from primary care. The primary-care-based approach was codified into the Chronic Care Model, developed by Ed Wagner and associates in the late 1990s (8). The carve-out approach generally was used by for-profit disease management companies that obtained contracts with health plans by agreeing to reduce health plan costs. The implementation of both approaches tended to emphasize specific chronic conditions such as diabetes, asthma and congestive heart failure. Research about patients with multiple chronic conditions was very limited (8, 20).

In the last decade, far more attention has been focused on patients with complex health care needs. Prominent researchers demonstrated that comorbidity in patients with chronic conditions was the rule rather than the exception (104). An intellectual shift gathered momentum, moving from a focus on single chronic conditions to multiple comorbid conditions – a shift from disease-centeredness to patient-centeredness, from disease management to care management. As part of this shift, population-wide risk stratification assumed a central role in health care thinking, with the stratification emphasizing patients' risk of incurring high costs, particularly hospitalization.

Findings

Care management can take place in a number of settings, each with its own challenges and potential for success.

- **Primary care.** Care management within primary care practices has become a central component of the widely-accepted Chronic Care Model. While many experts in the care of chronic conditions believe care management should be located within primary care settings, there are obstacles to making this a reality. About half of U.S. primary care practices have four or fewer physicians and lack the financial or organizational capacity to implement care management.
- **Vendor supported.** The commercial disease management model, which has begun to evolve from disease management to care management, separates these functions from primary care. The vendor companies receive lists of patients with chronic conditions from a health plan and may risk-adjust this list by cost and severity. Nurses working from call centers telephone patients and provide advice regarding their chronic conditions. Often the primary care physician does not know these calls are taking place and the nurses seldom meet their patients face-to-face (20).
- **Integrated multispecialty group.** Care management may be located within an integrated multispecialty group, but not specifically co-located within the primary care practices of the group. Patients are referred from primary care to a separate care management or chronic disease management department. The nurses who assist those patients generally meet the patients in person and communicate with their primary care physicians.
- **Hospital-to-home.** A common site for care management is a hospital, with care managers meeting with in-patients prior to discharge and – at times – following-up by home visit and/or telephone after discharge. This setting has great potential for care management to reduce readmissions and costs for complex patients.
- **Home-based**. For home-bound patients, care managers can provide all services in patients' homes. This differs from traditional home care services that are generally short-term.

Care management is a multidimensional activity with models ranging in level of intensity and breadth of scope (Table 2). This activity can be conducted by an individual care manager or by a care manager working within a multidisciplinary team.

Table 2: Key components of care management

Identify patients most likely to benefit from care management.
Assess the risks and needs of each patient.
Develop a care plan together with the patient/family.
Teach the patient/family about the diseases and their management, including medication management.
Coach the patient/family how to respond to worsening symptoms in order to avoid the need for hospital admissions.
Track how the patient is doing over time.
Revise the care plan as needed.

Care management also can be implemented as a coaching function, training patients and families to manage their own care rather than having a care manager provide the services directly (27). Coleman (27) describes four pillars of the coaching model of care management: assistance with medication self-management; creating a personal health record owned and maintained by the patient or family; timely follow-up with primary or specialty care; and a list of "red flags" indicative of a worsening condition and instructions on how to respond.

Findings

All care management models address problems such as falls and lack of mobility, chronic pain, incontinence, hearing loss, depression, visual impairment and dementia (31). Other components of care management may include: patient education; assistance with coping; crisis management; surveillance to determine if a disease process is worsening in order to intervene clinically prior to the need for emergency department or hospital care; navigating the health system; creation of a specific care plan; support for family caregivers, clinical care (e.g., medication intensification, wound care, regular laboratory testing, physical therapy); and coordination of care among primary care, specialty care and ancillary services (96).

Looking at care management from the perspective of self-management skills patients need to learn, Noel et al. (76) listed 22 such skills, including monitoring important symptoms, using medications correctly, managing medical emergencies, eating a healthy diet, staying physically active, using community resources, coping with emotional responses, managing pain, and adjusting to physical limits.

The six components of the Chronic Care Model are pertinent to care management of complex patients: health system organization, community resources, information systems, decision support, practice redesign, and self-management support (8). Only decision support requires major modification for care management because patients with multiple diagnoses cannot be managed by standard clinical practice guidelines.

How are patients identified for care management programs?

Care management programs targeted to people with multiple disease conditions, who are at high-risk for costly care, have the greatest opportunity for reducing health care costs (48). Stratifying the population for those likely to benefit from care management – those who are very sick but not too sick – is a crucially important task in maximizing the impact of care management on both quality and cost. Care management, a relatively intensive and costly service provided by a limited national pool of RNs, would not be appropriate for patients who are not expected to be high utilizers of expensive hospital, specialty and emergency department care. Similarly, it would be ineffective to provide care management to patients too sick to benefit.

Since the early 1990s, a number of accurate predictive models have been introduced to risk-stratify populations of patients, including those with complex health care needs to determine who will best benefit from care management (see Table 3). Models that include diagnostic and medication information are better at predicting future costs than models limited to prior cost measures (45).

Some health insurers and provider organizations offer intensive care management to the highest-risk patients, with care managers carrying a small panel of patients; less intensive care management, involving higher case loads per care manager, to patients with moderate risk; and no care management to those at low risk.

Table 3: Sample of predictive models

The Charlson Comorbidity Index	Designed to measure the risk of 1-year mortality in hospitalized patients using diagnosis codes for 17 conditions weighted to reflect their seriousness (35).
The Chronic Disease Score	This model looks at the classes of medications a patient is taking, weights them to correspond to disease complexity and severity, and predicts health status, mortality and hospitalization rates. It has been validated to correlate with physician ratings of disease severity and to predict mortality in the following year, hospitalization, and total health care costs after controlling for age, gender and health care visits (113, 83, 24).
The Hierarchical Condition Categories (HCC)	The HCC model of disease severity has been adopted by the Centers for Medicare and Medicaid Services (CMS) to risk-adjust capitation payments under the Medicare Advantage program. The model creates 804 diagnostic groups, which are further aggregated into 189 condition categories (HCCs) that are clinically- and cost-similar (77).
The Adjusted Clinical Groups (ACG)	This system, developed at Johns Hopkins, can be used to predict high-risk patients for inclusion in care management, to set risk-adjusted capitation rates, and to provide a risk-adjustment tool for measuring the quality and efficiency of medical practices. This system assigns patients to one of 32 diagnosis groups based on the duration, severity, diagnostic certainty, cause and need for specialty care services associated with the disease. Because a particular patient is likely to have diagnoses falling into more than one diagnosis group, 93 adjusted clinical groups (ACGs) were developed, and individual patients are assigned to an ACG based on their combination of diagnosis groups plus age and gender. Individuals within a given ACG have a similar pattern of morbidity and resource consumption over the course of a year *(www.acg.jhsph.edu)*.

Do research-based care management programs enhance quality and reduce costs for patients with complex health care needs?

Following is a summary of research studies analyzing quality and cost outcomes of care management programs for patients with complex health care needs, organized by the site of care management services. Additional detail on selected programs can be found in Appendix III. The examples cited here are research studies comparing care management interventions with usual care controls. Experiments in care management for complex patients that constitute quality improvement projects rather than research studies are discussed later in this paper.

Table 4: Summary of findings of care management studies

Site of study	Quality of care	Cost reduction
Primary care	7 out of 9 studies found improved quality	3 out of 8 studies found reduced hospital use for subpopulations
Vendor supported	Some evidence of improved quality	Inconclusive evidence
Integrated multispecialty group	2 out of 3 studies found improved quality	1 out of 3 studies found reduced costs
Hospital-to-home	Many studies found improved quality	Many studies found reduced hospital use and costs
Home-based	No clear evidence of improved quality	No evidence of reduced costs

Findings

Care management in primary care

Studies of care management in primary care show convincing evidence of improving quality. A literature search of controlled trials looking at care management for complex patients in primary care found nine substantial studies (12, 13, 25, 31, 40, 47, 98, 102, 107). These studies measured a variety of quality outcomes, including patient satisfaction, functional ability (capacity to perform basic activities of daily living), mortality, bed disability days, and overall quality of life. Of the nine studies, seven found improvements in quality compared with usual care (12, 13, 25, 31, 40, 98, 107).

Research suggests that it takes time to realize positive quality outcomes from care management in primary care. The two negative studies followed the patients for 12 months or fewer (47, 102), while the studies demonstrating quality improvement tended to follow patients for longer periods. In one study, negative results at 12 months turned into positive quality improvement at 24 months (31).

The results of care management studies in primary care are mixed regarding reductions in hospital use and health care costs. Eight of the nine studies of care management in primary care measured utilization or costs; of these, five failed to show statistically significant reductions in health care costs, hospital use or emergency department use. Three studies demonstrated reductions in hospital use for subpopulations of patients. Two of the promising studies, Care Management Plus (40) and Guided Care (13), feature well-trained RN care managers situated in primary care practices and working closely with primary care physicians. The Care Management Plus study found a significant reduction in hospital use for patients with higher comorbidity scores. During the first 8 months of a 32-month, multisite, randomized controlled trial, Guided Care reduced the number of hospital days by 24 percent and insurers' net health care costs by 11 percent although the differences were not yet statistically significant (62). The third positive study, Geriatric Resources for Assessment and Care of Elders (GRACE), utilized a nurse practitioner/social worker team as care managers, working closely with primary care physicians and a geriatrician (31). The higher-risk subgroup in the GRACE intervention group had a significantly lower hospitalization rate than higher-risk usual care patients (31). All of these studies enrolled patients with multiple chronic conditions who were at high or moderate risk of incurring major health care costs. Each program placed substantial emphasis on training the care manager team, keeping care manager panel sizes at reasonable levels, forging a close relationship between care managers and primary care physicians, and including care manager interactions with patients in-clinic, at home and by telephone.

Though primary care is a logical site for care management, stresses on primary care make it difficult to implement effective care management. Most patients with complex health care needs receive at least some of their care in primary care sites. Primary care would therefore seem to be an ideal site for care management of complex patients. However, few U.S. medical students are choosing adult primary care careers, creating a growing shortage of primary care physicians for adults. Even patients with health insurance are experiencing great difficulty gaining access to primary care when they need it (54). Current primary care physician visit lengths are not sufficient to handle the multiple problems of complex patients. Primary care practices need to manage overly large panels of patients with many visits per day to compensate for the low payment rate per visit (7). Thus, hospitalizations which could have been prevented by accessible and adequately-resourced primary care are rising (19, 60).

Findings

Over half of primary care physicians practice in small or medium-sized offices without the resources to develop care management programs. Moreover, a practice caring for only a few thousand patients will have relatively few with complex health care needs – too few to support an RN care manager. Thus, independent primary care practices unconnected to integrated delivery systems are unrealistic sites for the development of care management programs. The small practices would need to coalesce or work together with other practices to create a care management program for complex patients.

Vendor supported care management

Disease management companies have provided data to demonstrate cost savings, but the methodologies are weak, calling into question their findings. Congressional testimony by the Congressional Budget Office (29) concluded that "[t]he disease management industry has developed programs that claim to improve the quality of health care services and reduce their costs, but because of the limited number of available studies and the methodological issues they raise, it is not yet clear whether those programs can improve health outcomes, much less produce long-term cost savings." Krause (61) published a meta-analysis of disease management programs, showing a small positive effect for cost savings, with a greater effect for more severely ill patients. However, the interventions were extremely varied, and a number of the studies used pre-post designs without controls, making it difficult to draw valid conclusions. In a comprehensive review, Mattke (68) found that disease management programs improve some health outcomes but do not reduce costs, concluding that "payers and policy makers should remain skeptical about vendor claims." Some state Medicaid programs have contracted with disease management vendors to care manage their high-cost patients for the purpose of cost reduction. Two independent evaluations failed to find conclusive evidence that the interventions reduced costs (120, 44).

Care management within integrated delivery systems

Two out of three studies show care management in integrated delivery systems improves quality, but only one study using geriatricians achieved reductions in hospitalizations and costs. Two studies used multidisciplinary teams including RNs as care managers and one used a physician specialized in geriatrics. Hughes et al. (57) demonstrated that care management improves quality outcomes, but did not show a reduction in costs. Fenton et al. (42) found both improved quality outcomes and a reduction in hospitalization rates and total health care costs compared with matched controls. This study involved patients age 65 or older with a relatively high degree of complexity, cared for in primary care practices of Group Health Cooperative of Puget Sound. The study included two patient visits with a geriatrician, who then discussed a care plan with the patient's primary care physician. Following the intervention, study patients had markedly lower hospitalization rates while matched controls had increased hospitalization rates. Total health care costs were 26 percent lower among intervention subjects compared with controls. In the third study, Coleman et al. (26) found no quality or cost improvements although many patients failed to participate in the care management program.

Findings

Hospital-to-home care management

The most effective care management programs target complex patients being discharged from the hospital. Success is generally shown in improved quality of life, reduced mortality, lower hospital use, and reduced health care costs. Most post-hospital care management programs feature an RN assessing patients in the hospital and following them after discharge with home visits and/or telephonic encounters. Studies of post-hospital care management can be divided into those focusing on congestive heart failure (CHF) plus comorbidities and those involving hospitalized patients with a variety of diagnoses.

Congestive heart failure plus other diagnoses

Hospital-to-home care management of CHF patients, many of whom have complex health care needs, improves quality and reduces hospital readmissions and total costs. The largest literature on post-hospital interventions focuses on controlled studies of patients with congestive heart failure (CHF) plus other diagnoses.[1] Rich (86) led the first well-designed randomized controlled trial (RCT) of care management for this group of patients being discharged from the hospital. The study achieved significant reductions in readmissions and costs. Multiple review publications have analyzed up to 30 studies of patients discharged from the hospital with CHF plus other diagnoses and generally find improved quality, reduced hospital readmissions and lower costs.

Multiple diagnoses

Two highly significant interventions on elderly patients with a variety of diagnoses being discharged from the hospital found that nurse-led care management improved quality, substantially reduced hospital use, and lowered costs (73, 74, 27, 28). Compared with usual care, Naylor et al. (74) achieved a 37.6 percent reduction in total costs over 12 months. The Care Transitions Intervention (27, 81) using a self-management support or coaching paradigm, reports a significant reduction in readmissions and hospital costs. Many patients in these studies had a high degree of complexity.

A key to the success of hospital-to-home care management is post-discharge attention paid to patients once they are home. A Cochrane Review reveals that in-hospital discharge planning alone fails to reduce readmission rates, hospital length of stay or costs (99).

The Naylor et al. intervention is intensive, using advanced practice nurses as care managers, visiting patients in the hospital and following up with home visits and telephone encounters after discharge. The Care Transitions Intervention is less intensive, using advanced practice nurses or RNs conducting only one hospital visit, one home visit, and three follow-up phone calls. It is a coaching/empowerment model that targets transitions between care settings and seeks to impart skills, build confidence, and provide tools to enable individuals to assume a more active self care role in their transitions. In both cases, the care managers are well trained for their care manager role. Details of these two interventions are described in Appendix III.

1 Because many CHF patients also have other diagnoses, functional limitation, and are at high-risk for exaggerated health care costs, it is justified to include them in a review of patients with complex health care needs.

Home-based care management

Studies and reviews of home-based care management have been disappointing, with most studies failing to demonstrate significant cost or quality improvements. The studies focus on patients at home rather than patients transitioning from hospital to home (108, 46). These studies are highly heterogeneous and therefore difficult to summarize. One meta-analysis of the impact of home care on hospital days found a small to moderate reduction in hospital days, depending on the level of acuity and complexity of the patients involved (56). A more recent systematic review, however, found that these programs did not improve mortality, health status, service use or cost compared with usual care, though some studies found some improvement in patients' functional status (15). Finally, a Cochrane review of ten "hospital at home" trials did not find that admission avoidance leads to significant cost or quality improvements (100).

What are the characteristics of successful care management programs?

There are a number of common characteristics in care management programs that have had success in improving quality and reducing costs (Table 5).

Table 5: Keys to success

Patient selection
Person-to-person encounters
Home visits
Specially trained care managers with low case loads
Multidisciplinary teams including physicians
Presence of informal caregivers
Use of coaching

Selecting the right patients for care management — those that are complex but not those whose illness is so severe that palliative or hospice care is more appropriate — is associated with success in reducing costs and improving quality. The predictive models summarized in Table 3 have been relatively successful in identifying patients at risk of hospitalization and high costs.

Person-to-person encounters, including home visits, are important for effective care management. Care management performed remotely via telephone, using no in-person contact, has been unsuccessful for complex patients.

The training of care managers is an important factor in determining the success or failure of care management programs to reduce costs and improve quality. Most care managers are RNs who may be advanced practice nurses (e.g., nurse practitioners), geriatric nurses or general RNs specifically trained to provide care management services. Keeping care manager caseloads low is another factor influencing the success of care management programs.

Findings

Successful care management programs have care managers as part of multidisciplinary teams that involve physicians (97). Financial incentives and functional information systems have some effect on increasing physician participation, but these are not strong motivators (116). Co-locating care managers together with physicians in primary care practices may be a key ingredient in physician involvement (75).

The presence of informal family caregivers in the home improves the success of care management. Patients with complex health care needs, particularly those with physical or cognitive functional decline, often need the assistance of family caregivers in order to actively participate with RN care managers.

The use of coaching techniques is a viable approach to care management. Emphasis is placed on teaching patients and families to notice early warning signs of worsening disease so that the care team can intervene before an emergency department or hospital visit becomes necessary. The Guided Care and Care Transitions Intervention models, in particular, provide specific training on coaching patients and families in self-management skills.

The intensity (dose) of the care management needed for success in improving quality and reducing costs is unclear. Studies did not find evidence that the greater the intensity of care management the greater the chance of success. Care management dose can be measured by the amount of time a care manager spends with a patient, the duration of care management, the frequency of encounters, and the breadth of the encounters (only telephone calls vs. phone plus home and clinic visits). These variables affect how large a caseload the care manager can successfully handle. In the Care Management Plus study, Dorr et al. found that a higher dose of the intervention was associated with improved control of HbA1c and LDL cholesterol in patients with diabetes and hyperlipidemia. In particular, the more face-to-face time between a care manager and a patient, the better those outcomes (38). By contrast, the hospital-to-home Care Transitions Intervention (27) is grounded in a coaching paradigm, in which the care managers teach patients and families the skills needed to address problems themselves. The care managers in essence work themselves out of a job, leaving the skills behind with the patient and family. The Care Transitions Intervention was able to improve quality and reduce hospital use with a low-intensity intervention. These two models show that various levels of intensity may be effective in different settings.

How have research-based care management programs been adapted to real-world treatment settings?

Research studies can assist policy-makers in finding solutions to the problems of high cost and inadequate quality for patients with complex health care needs. However, they have significant limitations. Research studies generally provide more resources (e.g., RN care manager time) and higher-quality personnel (e.g., intensive care manager training) than real-world health care institutions, and therefore may be more effective in reducing costs and improving quality than is possible in the non-research world. Moreover, research studies may exclude certain categories of patients, for example, those with cognitive impairment, who may be the hardest to manage. Research findings therefore may not be generalizable to the population of patients with complex health care needs.

Findings

Limitations of payment policy often reduce the opportunity for care management within existing health care institutions, whereas research studies generally enjoy outside funding. For example, a hospital paid more for increased admissions would be less interested in care management programs that reduce admissions and a primary care practice paid only for physician visits would be unlikely to hire RN care managers whose work is unreimbursed.

For these reasons, it is important to examine the growing number of experiments in care management that have been implemented by health care organizations. These real world examples of care management are instructive, but they typically have a less rigorous evaluation of their impact than research-based programs. (Details of these experiments are provided in Appendix III.) In addition, the findings of demonstration projects sponsored by the Medicare program, which lie somewhere between formal research and real-world implementation, may be instructive in the search for effective care management (see Appendix V).

Medicare

With a few exceptions, Medicare demonstrations of care management involving patients with complex health care needs have failed to find consistent cost reductions. The wide gap between the success of many care management research studies demonstrating reduced costs of care and the failure of most Medicare demonstration projects to reduce costs shows the hazards of translating research findings into real-world health care institutions (70).

Since 1999, the Centers for Medicare and Medicaid Services (CMS) has conducted several chronic illness demonstrations involving hundreds of thousands of beneficiaries in over 30 health care programs (see Appendix V for details). As of early 2009, evaluations had been completed on about half of these demonstrations. While these demonstrations include an evaluation, they do not enjoy the advantages of additional, externally-funded personnel that are found in research-based care management programs.

Some care management programs targeted beneficiaries with specific diseases while others focused on high-cost or high-risk beneficiaries regardless of diagnosis. Interventions were usually provided by nurses with relatively little physician involvement. Most programs used randomized controls; a few used matched comparison groups. The results have generally been disappointing, with no widespread evidence of changes in evidence-based care, patient or provider satisfaction, or patient behavior change. This was true in part because pre-intervention data indicated already high levels of guideline-concordant care and patient satisfaction. Only a few programs were found to have sufficient savings to offset the fees they received to administer the program. Any cost savings generally resulted from reduced hospitalizations (11, 21).

An evaluation of three earlier Medicare Case Management demonstrations in the early 1990s concluded that the demonstrations failed to reduce Medicare costs because care managers received little or no cooperation from the patients' physicians, care managers were insufficiently trained, and the projects had no financial incentive to reduce Medicare spending (97).

One barrier to potential success of demonstration projects is the stipulation requiring cost savings for Medicare. If programs are unable to achieve cost savings, their participation in the demonstration may not be extended. This is contrary to the finding that some programs may be more expensive in the short-term or may need more time in order to achieve long-term success (51). Additionally, new methodological tools for evaluating the impact of a demonstration's policy initiatives, improving the timeliness of their evaluation, and facilitating a translation from trial interventions to policy implementation are needed to make these projects more effective (51).

Findings

Program of All-Inclusive Care for the Elderly (PACE)

Patients enrolled in PACE programs have significantly improved quality of life, functional status, reduced mortality, and lower hospital and nursing home use. PACE is a model of care developed in the 1970s to address the needs of high-cost, frail elderly patients. Thirty-five PACE programs exist around the United States; the original PACE program is On Lok Senior Health Services in San Francisco. PACE programs generally enroll dual-eligible (Medicare/Medicaid) patients and receive capitation payments from both Medicare and Medicaid. PACE programs invest a great deal of their capitation revenues in primary care in order to keep their participants out of hospitals, nursing homes and emergency rooms. PACE participants are cared for by well-trained interdisciplinary teams providing day health services, home care, assisted living and transportation (10, 72).

Data are conflicting on the question of whether PACE programs reduce total health care costs compared with similar populations not enrolled in PACE. While hospital and nursing home care are greatly reduced, major investment in out-patient care, day health and home health services, and a high ratio of PACE staff to participants creates new costs. One evaluation found that care delivered through PACE cost slightly more than care under fee-for-service Medicare and Medicaid (118). However, the study examined only the first year of PACE enrollment, a year when the delivery of a surge of needed services would be expected to increase costs. Moreover, the comparison group was not necessarily equivalent to the PACE group (30).

The employment of physicians appears to be an important factor in PACE's success. A PACE-like program providing care management but using community physicians rather than PACE-employed physicians had high hospital and emergency department use rates similar to those in settings without care management (59). A comparison of different PACE programs found that those with cohesive multidisciplinary teams had participants with the best functional status. A high staff ratio of aides who are ethnically concordant with the participants is associated with better functional status, and generally high staff-to-participant ratios corresponded with better self-assessed health outcomes (72).

Hospital discharge-based care management

Two successful hospital-to-home care transition programs have transformed their research interventions into real-world programs sponsored by health plans, integrated delivery systems, hospitals and home care agencies (74, 27). About 140 organizations are adopting Care Transitions, a coach-based training program. The Transitional Care Model has successfully implemented hospital-to-home care management with one large health insurer and one large integrated delivery system. Both investigators found that translating a research study into real-world settings requires considerable modifications of the original research protocol.

High-risk clinics

The transfer of high-risk patients from traditional primary care to separate "high-risk clinics" or "high-risk teams" has shown great promise. High-risk clinics recognize that traditional primary care practices have a difficult time creating intensive care management programs for the small proportion of their patients that have complex health care needs. High-risk clinics concentrate complex patients into one site and offer intensive primary care. Patients may be asked to leave their current primary care physician and transfer care to the high-risk clinic; alternatively patients can retain their primary care physician but receive most of their care in the high-risk setting. The high-risk clinics generally have small physician panel sizes, long visits, very small RN care manager caseloads, and multidisciplinary teams that often provide care at home.

One example can be found in Kaiser Permanente's Ohio region, where a high-risk clinic is being piloted. One geriatrician, an RN, a social worker, a pharmacist, and a scheduler care for 150 patients who have been categorized at high-risk of hospitalization. All visits are conducted at the patient's home, which limits the size of the panel. An initial evaluation, not yet complete, suggests a reduction in hospital use and hospital costs compared with a control group. Other examples of high-risk clinics are Capital Health Plan's Center for Chronic Care and the Veterans Health Administration geriatric primary care program (see Appendix III).

The initial experience with high-risk clinics suggests that panel size, visit length, and frequency of contact with patients – whether by physicians or RN care managers – are important determinants of successful care management (see details in Appendix III).

How do payment policies influence the creation and success of care management programs?

Provider organizations, whether hospitals or ambulatory care practices, are more likely to implement cost-reducing care management programs if they are paid by global budget or capitation rather than by fee-for-service payments. The incentive for globally-budgeted or capitated organizations is to reduce utilization and costs whereas the incentive of organizations paid fee-for-service is to increase utilization in order to earn more revenue. In addition, fee-for-service payments are generally paid only to clinicians – physicians, nurse practitioners and physician assistants – resulting in RN care managers and other members of a multidisciplinary team being an expense rather than a revenue producer and thereby making them a drain on provider organization finances.

The adoption of care management for complex, high-cost patients is often concentrated within a relatively small sector of health care provider organizations that receive per-patient or globally-budgeted payments. PACE programs, Kaiser Permanente, Group Health Cooperative, and the Veterans Health Administration, have been natural early adopters of care management for high-cost patients. In addition, payers for whom a relatively high percentage of their enrollees are high-cost are likely to embrace care management. The typical primary care practice – which receives most or all of its reimbursement through fee-for-service payments and has no financial consequences from patients going to nearby hospitals for emergency or in-patient care – has no incentive to hire RN care managers for its patients with complex health care needs.

Urban Medical Group in Boston illustrates the financial dilemma for organizations committed to care management but concerned about the financial implications (see Appendix III). Urban Medical formerly received a considerable fraction of its income in risk-adjusted capitation payments, which provided substantial income because the frailty of its patient panel allowed high capitation levels, and thereby supported intensive development of primary care for complex patients. Recently, more of their revenues have come from fee-for-service payments which do not support Urban Medical's philosophy of investing heavily in primary care in order to reduce hospital, emergency department and nursing home use. Moreover, Urban Medical is not an integrated delivery system including a hospital, so patients needing emergency or hospital care have no impact on Urban Medical's finances. Under fee-for-service financing, Urban Medical has no financial incentive to continue its program of intensive care management within primary care.

Current Medicare hospital payment policies provide a disincentive to reduce hospital readmissions, conflicting with the goals of care management. Hospital readmissions are extremely common in the United States; 20 percent of hospitalized patients are readmitted within 30 days and 56 percent within a year (41). About 90 percent of readmissions are unplanned, suggesting that they could have been avoided. Unplanned readmissions cost Medicare $17.4 billion in 2004 (58). The average hospital, which receives a significant amount of its revenues from Medicare DRG (diagnosis-related groups) payments, has little incentive to initiate hospital-to-home care management in order to reduce readmissions because the hospital usually is paid extra for a readmission. For example, Park Nicollet Health Services in Minnesota instituted hospital-to-home RN care management at an annual cost of $750,000 and successfully reduced readmissions from nearly 1 readmission per 6 admissions to 1 per 25. As a result of this improvement, Park Nicollet lost $5 million in Medicare payments (1).

Conclusion

A number of lessons can be drawn from the literature on care management. Care management provided by RNs, who are in close communication with physicians and are supported by an interdisciplinary team, can improve the quality of life and other clinical outcomes for complex patients in primary care, home, and hospital-to-home settings. In addition, care management within the hospital-to-home care transition, and possibly within primary care, can significantly reduce hospitalizations and health care costs for complex patients.

Some care management programs are more successful than others. Care management should be accurately targeted to patients with complex health care needs whose problems can be alleviated through medical-psychosocial intervention. Multidisciplinary teams involving both physicians and RNs with specialized training enhance the success of care management. By contrast, care management provided independent of primary care by disease management companies or through the use of telephone encounters alone is generally not effective. Finally, adopting a coaching paradigm to teach self-management skills to patients and families appears to enhance the value of care management.

A promising development is the high-risk clinic, which concentrates complex patients in one setting with a specialized interdisciplinary team intensively caring for a small panel of patients. High-risk clinics can address the problem of traditional primary care practices lacking resources to support care management for their relatively small numbers of patients with complex health care needs.

Implications for Policy-makers

Complex patients with five or more diagnoses are responsible for 76 percent of Medicare health care spending. Almost all of Medicare's spending growth since 1987 can be attributed to these patients. Any hope of reducing the growth rate of health care spending in the United States depends on preventing unnecessary hospital admissions, emergency department visits, and other high-cost services for this group of patients. Moreover, clinical outcomes for complex patients, as well as overall quality of life, are closely tied to expenditures since frequent hospitalizations are a marker for poor disease control. Care management has shown promise in both reducing hospital admissions and improving the quality of life for patients with complex health care needs. In order to encourage the use of care management programs and improve their success, policy-makers should consider the following:

Payment reform may improve the feasibility of care management programs by providing incentives for hospitals and primary care practices to implement these programs. The mode of health care payment strongly influences the adoption of care management by hospitals, primary care practices and integrated delivery systems. Hospitals have a disincentive to implement care management because they may see reduced admissions if a care management program is used. Likewise, primary care practices paid on a fee-for-service basis are uncompensated for the RN care managers and other members of an interdisciplinary team at the center of successful care management programs. A global payment approach covering ambulatory care, emergency treatment and hospital care would provide an incentive for primary care practices, hospitals and integrated delivery systems to implement care management programs.

Absent a broad scale payment reform, Medicare and Medicaid could consider a separate reimbursement mechanism for care managers. Many of the services provided by RN care managers are not reimbursed. Primary care is a major site for the care of complex patients and primary-care-based RN care management has been shown to improve care, and possibly to reduce costs, for that group of patients. In addition, primary-care-based RN care management could help relieve the current crisis in primary care. A substantial amount of a primary care physician's time is spent on a small number of patients with complex health care needs. RN care managers, who take over much of the time-consuming care of complex patients, improve primary care physician satisfaction (13) and thereby may help make adult primary care careers more attractive to young physicians.

The most effective care management programs for patients with complex health care needs are those targeting the transition from hospital to home. The explanation of this finding is multifactorial. Hospitalization is a strong identifier of patients who will benefit from care management. Hospitalization is a major life event for patients and may be a motivator to actively participate with care management services. Care transitions are important nodes of care at which access and quality often deteriorate; moreover, patients with complex health care needs are vulnerable to the dislocation of care transitions. Thus, targeting the transition itself appears to have a major impact on the care process.

Medicare and Medicaid could provide incentives to hospitals to cut readmissions. Hospital readmissions are costly to Medicare and Medicaid, but hospitals that are successful in reducing readmissions are penalized because current payment systems reimburse on a per-admission basis. Hospital-to-home care management programs that provide home visits and follow-up for recently discharged patients could be encouraged through payment reform.

Implications for Policy-makers

Care management requires personnel with particular skills not generally taught in traditional health professional educational institutions. If care management for complex patients became a widespread feature of the health care system, it would be important for the care managers to receive specific training, provided by accredited training programs. Care management programs are only as good as the care managers.

Care management provided independent of primary care through separate disease management programs has not been shown to be effective. Health plans and Medicaid programs have contracted with commercial disease management vendors for RN disease management and care management services, which are generally performed by telephone and poorly linked with patients' physicians. Evaluation of these programs has been inadequate and the programs have not been proven to reduce costs.

The aggregation of small and medium-sized primary care practices may be an effective way for these practices to sustain care management programs. About half of primary care physicians work in small practices which cannot support a full-time RN care manager, much less an interdisciplinary team. A program similar to the North Carolina Medicaid program that arranges for RN care managers to serve patients in a number of primary care practices located in the same geographic area could lead to greater adoption of care management by small practices. In addition, technical assistance to primary care practices on how to integrate RN care management into the practice's workflow would heighten the chances of success.

The establishment of high-risk clinics or practices for patients with complex health care needs has the potential to improve care and reduce costs for these patients. Medicare, Medicaid and private insurers could create financial incentives for provider organizations to develop these specialized primary care practices.

Integrated delivery systems have the most resources and capacity to develop care management programs. In these programs, high-risk patients receive a seamless web of care management services encompassing multiple transitions from hospital to home to primary and specialty care, with the highest-risk patients receiving the most intensive care management in high-risk settings.

The need for additional information

Some evidence suggests that RN care management situated within primary care practices can reduce hospitalizations and costs for complex patients, but further research results are needed to confirm this finding. Final data from the ongoing Guided Care study will be available in the future.

The examples of PACE programs, experimental high-risk clinics in Kaiser Permanente and the Veterans Administration health system, the Senior Health and Wellness program of PeaceHealth, the Capital Health Plan, and the Urban Medical Group show the advantages of creating primary care practices specifically for high-risk patients, using geriatricians and multidisciplinary teams with small panel sizes, and providing care at home or within the practice depending on the needs of the patient. More experiments with high-risk clinics, and the development of controlled studies of these clinics, may produce positive results for both cost and quality.

Appendix I References

1. Abelson R. "Hospitals Pay for Cutting Costly Readmissions." *New York Times*, May 9, 2009.
2. Anderson G. "Chronic Conditions: Making the Case for Ongoing Care." Baltimore: Johns Hopkins, November, 2007.
3. Ansari Z, Laditka JN, Laditka SB. "Access to Health Care and Hospitalization for Ambulatory Care Sensitive Conditions." *Medical Care Research and Review*, vol. 63, no. 6, 2006.
4. Arbaje AI, Wolff JL, Yu Q, Powe NR, Anderson GF, Boult C. "Postdischarge Environmental and Socioeconomic Factors and the Likelihood of Early Hospital Readmission Among Community-Dwelling Medicare Beneficiaries." *Gerontologist*, vol. 48, no. 4, 2008.
5. Baicker K, Chandra A. "Medicare Spending, the Physician Workforce, and Beneficiaries' Quality of Care." *Health Affairs Web Exclusive*, April 7, 2004.
6. Billings J, Mijanovich T. "Improving the Management of Care for High-Cost Medicaid Patients." *Health Affairs*, vol. 26, no. 8, 2007.
7. Bodenheimer T. "Primary care — Will It Survive?" *New England Journal of Medicine,* vol. 355, no. 9, 2006.
8. Bodenheimer T, Wagner EH, Grumbach K. "Improving Primary Care for Patients with Chronic Illness: The Chronic Care Model." *Journal of the American Medical Association*, vol. 288, nos. 14 and 15, 2002.
9. Bodenheimer T. "Disease Management — Promises and Pitfalls." *New England Journal of Medicine*, vol. 340, no. 15, 1999.
10. Bodenheimer T. "Long-term Care for Frail Elderly People — the On Lok Model." *New England Journal of Medicine*, vol. 341, no. 17, 1999.
11. Bott DM, Kapp MC, Johnson LB, Magno LM. "Disease Management for Chronically Ill Beneficiaries in Traditional Medicare." *Health Affairs*, vol. 28, no. 1, 2009.
12. Boult CV, Boult LB, Morishita L, Dowd B, Kane RL, Urdangarin CF. "A Randomized Clinical Trial of Outpatient Geriatric Evaluation and Management." *Journal of the American Geriatric Society*, vol. 49, no. 4, 2001.
13. Boult C, Reider L, Frey K, Leff B, Boyd CM, Wolff JL, Wegener S, Marsteller J, Karm L, Scharfstein D. "Early Effects of 'Guided Care' on the Quality of Health Care for Multimorbid Older Persons." *Journal of Gerontology*, vol. 63A, no. 3, 2008.
14. Boult C, Giddens J, Frey K, Reider L, Novak T. "Guided Care: A New Nurse-Physician Partnership in Chronic Care." New York: Springer Publishing Company, 2009.
15. Bouman A, van Rossum E, Nelemans P, Kempen GI, Knipschild P. "Effects of Intensive Home Visiting Programs for Older People With Poor Health Status: A Systematic Review." *BMC Health Services Research*, vol. 8, 2008.
16. Boyd CM, Shadmi E, Conwell LJ, Griswold M, Leff B, Brager R, Sylvia M, Boult C. "A Pilot Test of the Effect of Guided Care on the Quality of Primary Care Experiences for Multimorbid Older Adults." *Journal of General Internal Medicine*, vol. 23, no. 5, 2008.
17. Bureau of Health Professions. "Projected Supply, Demand, and Shortages of Registered Nurses, 2000–2020." Rockville, MD: Health Resources and Services Administration, 2002.
18. "Care Management Definition and Framework." Center for Health Care Strategies, 2007 *(www.chcs.org/usf_doc/Care_Management_Framework.pdf).*
19. Carter MW, Balaji D, Winters JM. "ED Visits by Older Adults for Ambulatory Care-sensitive and Supply-sensitive Conditions." *American Journal of Emergency Medicine*, vol. 24, no. 4, 2006.
20. Casalino LP. "Disease Management and the Organization of Physician Practice." *Journal of the American Medical Association,* vol. 294, no. 4, 2005.
21. Chen A, Brown R, Esposito D, Schore J, Shapiro R. *Report to Congress on the Evaluation of Medicare Disease Management Programs.* Washington: Mathematica Policy Research, February 14, 2008.
22. Chodosh J, Solomon DH, Roth CP, Chang JT, MacLean CH, Ferrell BA, Shekelle PG, Wenger NS. "The Quality of Medical Care Provided to Vulnerable Older Patients with Chronic Pain." *Journal of the American Geriatric Society*, vol. 52, no. 5, 2004.
23. Clancy CM. "The Persistent Challenge of Avoidable Hospitalizations." *Health Services Research*, vol. 40, no. 4, 2005.
24. Clark DO, Von Korff M, Saunders K, Baluch WM, Simon GE. "A Chronic Disease Score with Empirically Derived Weights." *Medical Care,* vol. 33, no. 8, 1995.
25. Cohen HJ, Feussner JR, Weinberger M, Carnes M, Hamdy RC, Hsieh F, Phibbs C, Lavori P. "A Controlled Trial of Inpatient and Outpatient Geriatric Evaluation and Management." *New England Journal of Medicine*, vol. 346, no. 12, 2002.

Appendix I References

26. Coleman EA, Grothaus LC, Sandhu N, Wagner EH. "Chronic Care Clinics: A Randomized Controlled Trial of a New Model of Primary Care for Frail Older Adults." *Journal of the American Geriatrics Society*, vol. 47, no. 7, 1999.
27. Coleman EA, Parry C, Chalmers S, Min SJ. "The Care Transitions Intervention: Results of a Randomized Controlled Trial." *Archives of Internal Medicine*, vol. 166, no. 17, 2006.
28. Coleman EA, Smith JD, Frank JC, Min SJ, Parry C, Kramer AM. "Preparing Patients and Caregivers to Participate in Care Delivery Across Settings: The Care Transitions Interventions." *Journal of the American Geriatrics Society*, vol. 52, no. 11, 2004.
29. Congressional Budget Office. "Disease Management in Medicare: Data Analysis and Benefit Design Issues." Testimony before the U.S. Senate Special Committee on Aging, September 19, 2002. (*www.cbo.gov).*
30. Congressional Budget Office. "Financing Long-Term Care for the Elderly." Washington: Congressional Budget Office, 2004.
31. Counsell SR, Callahan CM, Clark DO, Tu W, Buttar AB, Stump TE, Ricketts GD. "Geriatric Care Management for Low-Income Seniors." *Journal of the American Medical Association*, vol. 298, no. 22, 2007.
32. Crosson FJ. "The Delivery System Matters." *Health Affairs*, vol. 24, no. 6, 2005.
33. Cunningham PJ. "High Medical Cost Burdens, Patient Trust, and Perceived Quality of Care." *Journal of General Internal Medicine*, vol. 24, no. 3, 2008.
34. De Maeseneer JM, De Prins L, Gosset H, Heyerick J. "Provider Continuity In Family Medicine: Does It Make a Difference for Total Health Care Costs?" *Annals of Family Medicine*, vol. 1, no. 3, 2003.
35. Deyo RA, Cherkin DC, Ciol MA. "Adapting a Clinical Comorbidity Index for Use With ICD-9-CM Administrative Databases." *Journal of Clinical Epidemiology*, vol. 45, no. 6, 1992.
36. Disease Management Association of America. "Definition of Disease Management." 2005. (*www.dmaa.org/dm_definition.asp).*
37. Dorr DA, Wilcox A, Burns L, Brunker CP, Narus SP, Clayton PD. "Implementing a Multidisease Chronic Care Model in Primary Care Using People and Technology." *Disease Management*, vol. 9, no. 1, 2006.
38. Dorr DA, Wilcox A, Jones S, Burns L, Donnelly SM, Brunker C. "Care Management Dosage." *Journal of General Internal Medicine*, vol. 22, no. 6, 2007a.
39. Dorr DA, Wilcox A, McConnell KJ, Burns L, Brunker CP. "Productivity Enhancement for Primary Care Providers Using Multi-Condition Case Management." *American Journal of Managed Care*, vol. 13, no. 1, 2007b.
40. Dorr DA, Wilcox AB, Brunker CP, Burdon RE, Donnelly SM. "The Effect of Technology-Supported, Multidisease Care Management on the Mortality and Hospitalization of Seniors." *Journal of the American Geriatrics Society*, vol. 56, no. 12, 2008.
41. Epstein AM. "Revisiting Readmissions — Changing the Incentives for Shared Accountability." *New England Journal of Medicine*, vol. 360, no. 14, 2009.
42. Fenton JJ, Levine MD, Mahoney LD, Heagerty PJ, Wagner EH. "Bringing Geriatricians to the Front Lines: Evaluation of a Quality Improvement Intervention in Primary Care." *Journal of the American Board of Family Medicine,* vol. 19, no. 4, 2006.
43. Fireman B, Bartlett J, Selby J. "Can Disease Management Reduce Health Care Costs by Improving Care?" *Health Affairs*, vol. 23, no. 6, 2004.
44. Flowers L. "Disease Management in Fee-for-Service Medicaid Programs. AARP Public Policy Institute, March 2007.
45. Forrest CB, Lemke KW, Bodycombe DP, Weiner JP. "Medication, Diagnostic, and Cost Information as Predictors of High-Risk Patients in Need of Care Management." *American Journal of Managed Care*, vol. 15, no. 1, 2009.
46. Frick KD, Burton LC, Clark R, Mader SI, Naughton WB, Burl JB, Greenough WB, Steinwachs DM, Leff B. "Substitutive Hospital at Home for Older Persons: Effects on Costs." *American Journal of Managed Care*, vol. 15, no. 1, 2009.
47. Gagnon AJ, Schein C, McVey L, Bergman H. "Randomized Controlled Trial of Nurse Case Management of Frail Older People." *Journal of the American Geriatrics Society*, vol. 47, no. 9, 1999.
48. Goetzel RZ, Ozminkowski RJ, Villagra VG, Duffy J. "Return on Investment in Disease Management: A Review." *Health Care Financing Review*, vol. 26, no. 4, 2005.
49. Grabowski DC. "The Cost-Effectiveness of Noninstitutional Long-Term Care Services: Review and Synthesis of the Most Recent Evidence." *Medical Care Research and Review*, vol. 63, no. 1, 2006.
50. Grabowski DC. "Special Needs Plans and the Coordination of Benefits and Services for Dual Eligibles." *Health Affairs*, vol. 28, no. 1, 2009.

Appendix I References

51. Guterman S. Serber MP. "Enhancing Value in Medicare: Demonstrations and Other Initiatives to Improve the Program." New York: Commonweath Fund, January 2007.

52. Gwadry-Sridhar FH, Flintoft V, Lee DS, Lee H, Guyatt GH. "A Systematic Review and Meta-analysis of Studies Comparing Readmission Rates and Mortality Rates in Patients with Heart Failure." *Archives of Internal Medicine*, vol. 164, no. 21, 2004.

53. Hauptman PJ, Bednarek HL. "The Business Concept of Leader Pricing as Applied to Heart Failure Disease Management." *Disease Management*, vol. 7, no. 3, 2004.

54. Hoffman C, Schwartz K. "Eroding Access Among Nonelderly U.S. Adults With Chronic Conditions: Ten Years of Change." *Health Affairs*, vol. 27, no. 5, 2008.

55. Holland R, Battersby J, Harvey I, Lenaghan E, Smith J, Hay L. "Systematic Review of Multidisciplinary Interventions in Heart Failure. *Heart*, vol. 91, no. 7, 2005.

56. Hughes SL, Ulasevich A, Weaver FM, Henderson W, Manheim L, Kubal JD, Bonarigo F. "Impact of Home Care on Hospital Days: A Meta-analysis." *Health Services Research*, vol. 32, no. 4, 1997.

57. Hughes SL, Weaver FM, Giobbie-Hurder A, Manheim L, Henderson W, Kubal JD, Ulasevich A, Cummings J; Department of Veterans Affairs Cooperative Study Group on Home-Based Primary Care. "Effectiveness of Team-Managed Home-Based Primary Care: A Randomized Multicenter Trial." *Journal of the American Medical Association*, vol. 284, no. 22, 2000.

58. Jencks SF, Williams MV, Coleman EA. "Rehospitalizations among Patients in the Medicare Fee-for-Service Program." *New England Journal of Medicine*, vol. 360, no. 14, 2009.

59. Kane RL, Homyak P, Bershadsky B, Flood S. "The Effects of a Variant of the Program for All-inclusive Care of the Elderly on Hospital Utilization and Outcomes." *Journal of the American Geriatrics Society*, vol. 54, no. 2, 2006.

60. Kim, S. "Burden of Hospitalizations Primarily Due to Uncontrolled Diabetes." *Diabetes Care Brief Report*, vol. 30, no. 5, May 2007.

61. Krause DS. "Economic Effectiveness of Disease Management Programs: A Meta-analysis." *Disease Management*, vol. 8, no. 2, 2005.

62. Leff B, Reider L, Frick KD, Scharfstein DO, Boyd CM, Frey K, Karm L, Boult C. "Guided Care and the Cost of Complex Healthcare: A Preliminary Report." *American Journal of Managed Care*, vol. 15, no. 8, 2009.

63. Leveille SG, Wagner EH, Davis C, Grothaus L, Wallace J, LoGerfo M, Kent D. "Preventing Disability and Managing Chronic Illness in Frail Older Adults: A Randomized Trial of a Community-Based Partnership with Primary Care." *Journal of the American Geriatrics Society*, vol. 46, no. 10, 1998.

64. Lin P. "Drug Interactions: a Method to the Madness." *Perspectives in Cardiology*, vol. 20, no. 10, 2004.

65. Luttik ML, Jaarsma T, Moser D, Sanderman R, van Veldhuisen DJ. "The Importance and Impact of Social Support on Outcomes in Patients with Heart Failure." *Journal of Cardiovascular Nursing*, vol. 20, no. 3, 2005.

66. Lynch JP, Forman SA, Graff S, Gunby MC. "High-Risk Population Health Management — Achieving Improved Patient Outcomes and Near-Term Financial Results." *American Journal of Managed Care*, vol. 6, no. 7, 2000.

67. Machlin S, Cohen JW, Beauregard K. "Health Care Expenses for Adults With Chronic Conditions, 2005." Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, Statistical Brief #203, May 2008.

68. Mattke S, Seid M, Ma S. "Evidence for the Effect of Disease Management: Is $1 Billion a Year a Good Investment?" *American Journal of Managed Care*, vol. 13, no. 12, 2007.

69. McAlister FA, Lawson FME, Teo KI, Armstrong PW. "A Systematic Review of Randomized Trials of Disease Management Programs in Heart Failure." *American Journal of Medicine*, vol. 110, no. 5, 2001.

70. Meyer J, Smith BM. "Chronic Disease Management: Evidence of Predictable Savings." Health Management Associates, November 2008.

71. Min LC, Reuben DB, MacLean CH, Shekelle PG, Solomon DH, Higashi T, Chang JT, Roth CP, Kamberg CJ, Adams J, Young RT, Wenger NS. "Predictors of Overall Quality of Care Provided to Vulnerable Older People." *Journal of the American Geriatric Society*, vol. 53, no. 10, 2005.

72. Mukamel DB, Peterson DR, Temkin-Greener H, Delavan R, Gross D, Kunitz SJ, Williams TF. "Program Characteristics and Enrollees' Outcomes in the Program of All-Inclusive Care for the Elderly (PACE)." *The Milbank Quarterly*, vol. 85, no. 3, 2007.

73. Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, Schwartz JS. "Comprehensive Discharge Planning and Home Follow-Up of Hospitalized Elders: A Randomized Clinical Trial." *Journal of the American Medical Association*, vol. 281, no. 7, 1999.

74. Naylor MD, Brooten DA, Campbell RL, Maislin F, McCauley KM, Schwartz JS. "Transitional Care of Older Adults Hospitalized With Heart Failure: A Randomized, Controlled Trial." *Journal of the American Geriatric Society*, vol. 52, no. 5, 2004.

Appendix I References

75. Netting FE, Williams FG. "Geriatric Case Managers: Integration into Physician Practices." *Care Management Journals*, vol. 1, no. 1, 1999.

76. Noel PH, Parchman ML, Williams JW, Cornell JE, Shuko L, Zeber JE, Kazis LE, Lee AFS, Pugh JA. "The Challenges of Multimorbidity from the Patient Perspective." *Journal of General Internal Medicine*, vol. 22, suppl. 3, 2007.

77. Noyes K, Liu H, Temkin-Greener H. "Medicare Capitation Model, Functional Status, and Multiple Comorbidities: Model Accuracy." *American Journal of Managed Care*, vol. 14, no. 10, 2008.

78. Okie S. "Home Delivery — Bringing Primary Care to the Housebound Elderly." *New England Journal of Medicine*, vol. 359, no. 23, 2008.

79. Paez KA, Zhao L, Hwang W. "Rising Out-Of-Pocket Spending For Chronic Conditions: A Ten-Year Trend." *Health Affairs*, vol. 28, no. 1, 2009.

80. Parchman ML, Culler SD. "Preventable Hospitalizations in Primary Care Shortage Areas. An Analysis of Vulnerable Medicare Beneficiaries." *Archives of Family Medicine*, vol. 8, no. 6, 1999.

81. Parry, C; Min, S, Chugh, A, Chalmers S, Coleman, EA. "Further Application of The Care Transitions Intervention: Results of a Randomized Controlled Trial Conducted in a Fee-For-Service Setting." *Home Health Care Services Quarterly*. vol. 28, no. 4, 2009.

82. Phillips CO, Wright SM, Kern DE, Singa RM, Shepperd S, Rubin HR. "Comprehensive Discharge Planning with Postdischarge Support for Older Patients with Congestive Heart Failure. A Meta-analysis." *Journal of the American Medical Association*, vol. 291, no. 11, 2004.

83. Putnam KG, Buist DS, Fishman P, Andrade SE, Boles M, Chase GA, Goodman MJ, Gurwitz JH, Platt R, Raebel MA, Arnold Chan K. "Chronic Disease Score as a Predictor of Hospitalization." *Epidemiology*, vol. 13, no. 3, 2002.

84. Reuben DB, Frank JC, Hirsch SH, McGuigan KA, Maly RC. "A Randomized Clinical Trial of Outpatient Comprehensive Geriatric Assessment Coupled with an Intervention to Increase Adherence to Recommendations." *Journal of the American Geriatrics Society*, vol. 47, no. 3, 1999.

85. Reuben DB. "Better Care for Older People with Chronic Diseases." *Journal of the American Medical Association*, vol. 298, no. 22, 2007.

86. Rich MW, Beckham V, Wittenberg C, Leven CL, Freedland KE, Carney RM. "A Multidisciplinary Intervention to Prevent the Readmission of Elderly Patients With Congestive Heart Failure." *New England Journal of Medicine*, vol. 333, no. 18, 1995.

87. Rich MW, Gray DB, Beckham V, Wittenberg C, Luther P. "Effect of a Multidisciplinary Intervention on Medication Compliance in Elderly Patients with Congestive Heart Failure." *American Journal of Medicine,* vol. 101, no. 3, 1996.

88. Rich MW. "Heart Failure Disease Management: A Critical Review." *Journal of Cardiac Failure,* vol. 5, no. 1, 1999.

89. Rich MW. "Heart Failure in the Elderly: Strategies to Optimize Outpatient Control and Reduce Hospitalizations." *American Journal of Geriatric Cardiology,* vol. 12, no. 1, 2003.

90. Rittenhouse DR, Casalino LP, Gillies RR, Shortell SM, Lau B. "Measuring the Medical Home Infrastructure in Large Medical Groups." *Health Affairs*, vol. 27, no. 5, 2008.

91. Rosenbaum S. "The CMS Medicaid Targeted Case Management Rule: Implications for Special Needs Service Providers and Programs." Center for Health Care Strategies Issue Brief, April 2008.

92. Roth MT, Weinberger M, Campbell WH., "Measuring the Quality of Medication Use in Older Adults." *Journal of the American Geriatrics Society*, vol. 57, no. 4, 2009.

93. Safford MM, Allison JJ, Kiefe CI. "Patient complexity: More than Comorbidity. The Vector Model of Complexity." *Journal of General Internal Medicine*, vol. 22, suppl. 3, 2007.

94. Sands LP, Wang Y, McCabe GP, Jennings K, Eng C, Covinsky KE. "Rates of Acute Care Admissions for Frail Older People Living with Met Versus Unmet Activity of Daily Living Needs." *Journal of the American Geriatrics Society*, vol. 54, no. 2, 2006.

95. Saultz JW, Lochner J. "Interpersonal Continuity of Care and Care Outcomes: A Critical Review." *Annals of Family Medicine*, vol. 3, no. 2, 2005.

96. Schein C, Gagnon AJ, Chan L, Morin I, Grondines J. "The Association Between Specific Nurse Case Management Interventions and Elder Health." *Journal of the American Geriatric Society,* vol. 53, no. 4, 2005.

97. Schore JL, Brown RS, Cheh VA. "Case Management for High-Cost Medicare Beneficiaries." *Health Care Financing Review,* vol. 20, no. 4, 1999.

98. Schraeder C, Shelton P, Sager M. "The Effects of a Collaborative Model of Primary Care on the Mortality and Hospital Use of Community-Dwelling Older Adults." *Journal of Gerontology*, vol. 56A, no. 2, 2001.

99. Shepperd S, Parkes J, McClaran J, Phillips C. "Discharge Planning from Hospital to Home." *Cochrane Database of Systematic Reviews* 2003, Issue 3. Art. No. CD000313.

Appendix I References

100. Shepperd S, Doll H, Angus RM, Clarke MJ, Iliffe S, Kalra L, Ricauda NA, Wilson AD. "Admission Avoidance Hospital at Home." *Cochrane Database of Systematic Reviews* 2008, Issue 4. Art. No. CD007491.

101. Simon SR, Chan KA, Soumerai SB, Wagner AK, Andrade SE, Feldstein AC, Lafata JE, Davis RL, Gurwitz JH. "Potentially Inappropriate Medication Use by Elderly Persons in US Health Maintenance Organizations." *Journal of the American Geriatrics Society*, vol. 53, no. 2, 2005.

102. Sledge WH, Brown KE, Levine JM, Fiellen DA, Chawarski M, White WD, O'Connor PG. "A Randomized Trial of Primary Intensive Care to Reduce Hospital Admissions in Patients with High Utilization of Inpatient Services." *Disease Management*, vol. 9, no. 6, 2006.

103. Sochalski J, Jaarsma T, Krumholz HM, Laramee A, McMurray JJV, Naylor MD, Rich MW, Riegel B, Stewart S. "What Works in Chronic Care Management: The Case of Heart Failure." *Health Affairs*, vol. 28, no. 1, 2009.

104. Starfield B, Lemke KW, Bernhardt T, Foldes SS, Forrest CB, Weiner JP. "Comorbidity: Implications for the Importance of Primary Care in 'Case' Management." *Annals of Family Medicine*, vol. 1, no. 1, 2003.

105. Steiner BD, Denham AC, Ashkin E, Newtom WP, Wroth T, Dobson LA. "Community Care of North Carolina: Improving Care Through Community Health Networks." *Annals of Family Medicine*, vol. 6, no. 4, 2008.

106. Stewart S, Pearson S, Horowitz JD. "Effects of a Home-Based Intervention Among Patients with Congestive Heart Failure Discharged from Acute Hospital Care." *Archives of Internal Medicine*, vol. 158, no. 10, 1998.

107. Stock R, Mahoney ER, Reece D, Cesario L. "Developing a Senior Healthcare Practice Using the Chronic Care Model: Effect on Physical Function and Health-Related Quality of Life." *Journal of the American Geriatric Society,* vol. 56, no. 7, 2008.

108. Stuck AE, Aronow HU, Steiner A, Alessi CA, Bula CJ, Gold MN, Yuhas KE, Nisenbaum R, Rubenstein LZ, Beck JC. "A Trial of Annual In-Home Comprehensive Geriatric Assessments for Elderly People Living in the Community." *New England Journal of Medicine*, vol. 333, no. 18, 1995.

109. Sylvia ML, Griswold M, Dunbar L, Boyd CM, Park M, Boult C. "Guided Care: Cost and Utilization Outcomes in a Pilot Study." *Disease Management*, vol. 11, no. 1, 2008.

110. The Lewin Group. "Designing and Implementing Medicaid Disease and Care Management Programs: A User's Guide." AHRQ Publication No. 07(08)-0063, March 2008.

111. Thorpe KE, Howard DH. "The Rise In Spending Among Medicare Beneficiaries: The Role of Chronic Disease Prevalence and Changes in Treatment Intensity." *Health Affairs Web Exclusive,* August 22, 2006.

112. Vogeli C, Shields AE, Lee TA, Gibson TB, Marder WD, Weiss KB, Blumenthal D. "Multiple Chronic Conditions: Prevalence, Health Consequences, and Implications for Quality, Care Management, and Costs." *Journal of General Internal Medicine,* vol. 22, suppl. 3, 2007.

113. Von Korff M, Wagner EH, Saunders K. "A Chronic Disease Score from Automated Pharmacy Data." *Journal of Clinical Epidemiology*, vol. 45, no. 2, 1992.

114. Wagner EH. "Deconstructing Heart Failure Disease Management." *Annals of Internal Medicine*, vol. 141, no. 8, 2004.

115. Wallace P. "Care, Whether it's Called Population- or Disease-Management, Sidney Garfield, MD, Would Like the Idea." *The Permanente Journal*, vol. 9, no. 2, 2005.

116. Waters TM, Budetti PP, Reynolds KSE, Gillies RR, Zuckerman HS, Alexander JA, Burns LR, Shortell SM. "Factors Associated with Physician Involvement in Care Management." *Medical Care*, vol. 39, no. 7, 2001.

117. Weiss LJ, Blustein J. "Faithful Patients: The Effect of Long-Term Physician-Patient Relationships on the Costs and Use of Health Care by Older Americans." *American Journal of Public Health*, vol. 86, no. 12, 1996.

120. White AJ. "Evaluation of the Program of All-Inclusive Care for the Elderly." Cambridge, MA: Abt Associates, Inc., 1998.

121. Wieland D, Lamb VL, Sutton SR, Boland R, Clark M, Friedman S, Brummel-Smith K, Eleazer GP. "Hospitalization in the Program of All-Inclusive Care for the Elderly (PACE): Rates, Concomitants, and Predictors." *Journal of the American Geriatrics Society*, vol. 48, no. 11, 2000.

122. Williams C. "Medicaid Disease Management: Issues and Promises." Kaiser Commission on Medicaid and the Uninsured, September 2004.

123. Windham BG, Bennett RG, Gottlieb S. "Care Management Interventions for Older Patients with Congestive Heart Failure." *American Journal of Managed Care*, vol. 9, no. 6, 2003.

124. Wolff JL, Starfield B, Anderson G. "Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly." *Archives of Internal Medicine,* vol. 162, no. 20, 2002.

Appendix II Methodological discussion

The definition of patients with complex health care needs is not precise. These patients are actually the far end of a spectrum of patients rather than a well-demarcated group. The most precise method for categorizing this group of patients is to use predictive models, which can assign a numerical value to the risk of hospitalization or of high health services utilization. However, few studies use these models to categorize their study population. Most studies addressing patients with complex health care needs enroll a mix of complex and near-complex patients. The results of each study depend to a considerable extent on the mix of patients enrolled.

Research on practice improvement interventions are fraught with difficulty. Comparing a new medication with placebo is relatively simple methodologically because the attributes and intensity (dose) of the medication is standardized. Interventions to improve health care services, in contrast, have several inherent limitations.

1) The research outcomes may be operator-dependent; i.e., an excellent RN care manager might succeed in improving care and reducing costs while a less effective care manager doing precisely the same things might fail.

2) It is difficult to standardize the attributes of the interventions in the same way that medication attributes can be standardized. Even the same person implementing an intervention for different patients will alter the intervention to customize it to the patient's situation.

3) It is difficult to standardize the intensity (dose) of the intervention in the same way that medication doses are uniform. A care management intervention involving 1 home visit and 5 follow-up phone calls is quite different from the same intervention with 3 home visits and 15 phone calls; also what takes place during those visits and phone calls is variable.

4) The context within which the intervention is implemented may have a major effect on the outcome; for example, in a fee-for-service environment, the financial incentives for both hospitals and physicians to hospitalize patients might trump the positive influence of care management to reduce hospitalizations, in contrast to a globally-budgeted integrated delivery system in which perverse incentives may not exist. Similarly, the site within which care management is conducted may have a major influence on the outcome; even examining only interventions conducted in primary care practices, there is wide variation on how primary care practices are organized.

5) Follow-up periods in research studies tend to be short, sometimes less than 12 months. However, for example, an intervention that reduces hospital readmissions over 12 months may not succeed over a 5-year period. Alternatively, interventions that grow over the first few months in their quality of implementation may obtain better results with longer time periods. Overall, patients should be followed for at least two and preferably more years in this type of research.

6) Inclusion and exclusion criteria used in research studies may make the population studied different from the population to whom the intervention would be targeted in the real world, potentially reducing the validity of the findings. For example, some studies exclude patients with dementia, who make up a significant fraction of patients with complex health care needs in the real world.

7) The gap between a research finding and the implementation of that finding in the rather chaotic real world of health care delivery is wide, such that positive findings may not translate into scalable effective reform.

Appendix III Descriptions of care management programs

Controlled research studies

Care Management Plus:

Care Management Plus, initiated in the Intermountain Healthcare system in Utah, placed one RN care manager in each of 7 primary care practices with a total of 54 physicians. The care managers assessed patient needs, formulated a care plan with the patient, family and physician, and assisted in implementing the care plan. The care managers scheduled in-practice visits, home visits and phone calls with their patients; were available by phone for their patients; and arranged multiple services as needed. A Care Management Plus module on the electronic health record was used for documentation, care protocols, reminders, and communication with physicians and other members of the primary care team (38, 40). Patients receiving care management were compared with similar patients in 6 control practices, also at Intermountain Healthcare. After two years, hospitalizations were not significantly lower for the care managed patients than for the control patients, though for patients with diabetes (who had other diagnoses as well), hospitalizations after two years were significantly lower in the care managed group than in the control practices. Total costs were not measured.

What is the significance of the Care Management Plus finding that hospital use was significantly lower only for patients whose chronic conditions included diabetes as one of their diagnoses? It is important because it reinforces the finding that accurate identification of patients with complex health care needs is crucial to effective care management. Not all patients in the Care Management Plus study had complex health care needs, but the patients with diabetes had higher comorbidity scores than those without diabetes (38), demonstrating that the patients with diabetes were more likely to be patients with complex health care needs and high costs – precisely the patients who might be expected to benefit from care management.

Guided Care:

The Guided Care intervention is organized by a group at Johns Hopkins School of Medicine (14). In the Guided Care model, RNs are trained in care management of complex patients, perform a home-based patient assessments, and develop care plans together with patients and their primary care physicians. Then the RNs follow a panel of about 50 patients through home visits, phone calls and visits in the primary care practice. The RNs are trained to teach patients and families self-management skills, including early identification of worsening symptoms that can be addressed before an emergency department or hospital admission becomes necessary. A small pilot study compared 75 Guided Care patients with a high level of complexity (as measured by the ACG predictive model), with 75 nonrandomized controls with a somewhat lower level of complexity. Guided Care patients had lower total health expenditures, hospital admissions, hospital days and emergency department visits, but these differences were not statistically significant (16, 109). A larger 32-month, multisite, randomized controlled trial study is taking place at this time (13). During the first 8 months of this trial, Guided Care reduced the number of hospital days by 24 percent and insurers' net health care costs by 11 percent for the intervention group, though the differences were not yet statistically significant; final results will be published in 2010 and 2011 (62).

GRACE:

The Geriatric Resources for the Assessment and Care of Elders (GRACE) study, situated at an urban system of community clinics affiliated with the Indiana University School of Medicine, enrolled low-income seniors with multiple diagnoses, 25 percent of whom were at high-risk for hospitalization. At two years, the use of the emergency department was significantly lower in the

group receiving the GRACE intervention compared with the usual care group, but hospital admission rates were not significantly different between the two groups. However, the subgroup defined at the start of the study as having a high-risk of hospitalization was found to have a significantly lower hospitalization rate compared with high-risk usual care patients (31).

Hospital discharge studies

Patients with CHF and other diagnoses

Rich (86) led the first well-designed randomized controlled trial (RCT) of care management for congestive heart failure (CHF) patients being discharged from the hospital. The intervention consisted of a number of pre-discharge visits by nursing, dietary, social work and cardiology personnel plus home visits and phone contact post-discharge. The study achieved a 56 percent reduction in CHF readmissions and a 29 percent reduction in all-cause admissions within 90 days, with total health care costs dropping by $153 per patient per month. Six months after discharge, CHF admissions were still down by 47 percent. Quality of life improved significantly in the intervention group. Stewart et al. (106) came to similar conclusions with a more limited intervention, involving one pre-discharge nurse visit and one post-discharge home visit by a nurse and a pharmacist. Several systematic reviews or meta-analyses of similar studies corroborate that hospital-to-home care management of patients with complex health care needs improves quality and reduces hospital readmissions and total costs (70, 121).

Transitional Care model:

Naylor et al (73) studied patients with multiple diagnoses at high-risk for hospital readmissions, comparing hospital-to-home care management with usual care. Intervention group patients received comprehensive discharge planning and home follow-up by advanced practice nurses, including several in-hospital visits, at least two home visits after discharge, further home visits as needed, at least weekly phone calls, and easy telephone access to the advanced practice nurses. After two years, readmissions and total Medicare costs were significantly lower for the care managed group; other quality measures were unchanged.

Naylor et al. (74) performed a similar RCT for elderly patients with congestive heart failure plus an average of five other active comorbid conditions. The intervention was even more intensive than that used in the 1999 study, with advanced practice nurses, trained for two months by a multidisciplinary geropsychiatric team, performing daily in-hospital visits, making at least 8 home visits during the three post-discharge months, and being available by telephone. One year after the initial discharge, intervention patients had significantly fewer readmissions than the control group. The cost of this intensive intervention utilizing high-cost personnel was more than offset by reductions in hospitalizations and emergency department visits, resulting in a 37.6 percent reduction in total costs over the 12-month study period. Short-term improvements in overall quality of life were demonstrated for intervention patients.

Care Transitions intervention:

Coleman et al. (27, 28) pioneered Care Transitions for patients being discharged from the hospital with a variety of diagnoses. The participants tended to have complex health care needs. The Care Transitions intervention involves nurses (called transition coaches) meeting with the patient in the hospital, performing a home visit within three days after discharge, and doing three follow-up phone calls to the patient. The transition coaches received training on coaching philosophy, which emphasizes teaching patients and families the skills needed to manage their own care rather than having coaches arrange all of the services. Intervention

patients had statistically significant lower total hospital readmission rates than control patients within 30 and 90 days after the initial hospital discharge, and lower rehospitalization for the same diagnosis as the initial hospitalization at 180 days. Intervention patients had significantly lower hospital costs (total health care costs were not measured) at 90 and 180 days. A follow-up randomized controlled trial found a significant reduction in readmissions within 90 days and a highly significant reduction in readmissions for the same diagnoses at 180 days (81). An advantage of the Care Transitions intervention is the relatively low intensity and cost of the intervention itself, consisting of only 5 interactions with the patients, allowing transition coaches to manage a panel of 24 to 28 patients at a time.

Care management experiments without controlled studies

Group Health Cooperative:

Group Health Cooperative (GHC) in Washington state risk assesses its population age 65+ based on functional status (severity of illness) rather than specific diagnosis. Using a primary-care-based RN leading a multidisciplinary team, GHC has reduced hospital admissions and hospital days over a three-year period for complex patients through improved medication management, fall prevention, exercise, care of incontinence and depression, and other care management interventions. Group Health has tried other interventions to improve care and reduce costs for complex elderly patients including palliative care at home and use of geriatric nurse practitioners as care managers, and has found it difficult to reduce hospitalizations in part because Group Health's baseline hospitalization rate is low. Group Health has also found that care management for patients with dementia is particularly challenging. Group Health has performed a fascinating innovation by creating a patient-centered medical home pilot, which reduced panel sizes and increased the visit length of its primary care physicians. While the evaluation of this experiment included all patients, not only those with complex health care needs, the results were highly successful with improvements in outcomes and cost savings due to reduced emergency department visits. A conclusion from Group Health is that excellent primary care is one route to higher quality and reduced costs.

Kaiser Permanente:

Starting around 1994, Kaiser Permanente Northern California implemented care management for patients with coronary heart disease, heart failure, diabetes and asthma. Under this program, care managers (generally nurses, but respiratory therapists for patients with asthma) conducted planned visits with patients in poor control, referring the patients back to primary care after they had achieved good disease control. A separate program within primary care involved nurses and social workers providing care management for patients with complex health care needs. Only the disease-specific programs were studied; costs of the intervention were approximately equal to savings created. Quality improved at all 17 medical centers within the Kaiser Permanente Northern California region. The evaluation concluded that costs for the disease-specific care-managed patients increased slower than they would have increased in the absence of these programs. Because the disease-specific programs did not target the highest-cost patients, there was insufficient opportunity for cost reduction (43).

More recently, some Kaiser Permanente regions have launched demonstration care management programs for high-cost patients. The Complete Care for Complex Conditions program – targeted to Kaiser patients with high utilization of care resources – focuses on the 1 percent of Kaiser members who incur 27 percent of total costs. Two Kaiser sites implemented Naylor's hospital-to-home care management program (see above for a discussion of this program), though they

targeted a broader group of patients than the highest cost 1 percent. The Northwest region has a program for frail elders in long-term care facilities, assisted living, or homebound, using a multidisciplinary team including a nurse practitioner to visit patients where they live. Kaiser Colorado has physician/nurse practitioner teams, sometimes with a pharmacist and physical therapist, going to about 40 assisted living facilities and doing group visits with Kaiser members in each facility. Each team visits about 8 facilities and cares for a panel of 150 to 200 patients.

The Hawaii and Ohio Kaiser regions are testing the concept of a high-risk team, in which patients with complex health care needs leave their primary care physician and are cared for by a specialized separate practice. In Ohio's pilot, a geriatrician, RN, social worker, pharmacist, and scheduler care for 150 patients. Elderly patients are evaluated with the likelihood of hospitalization predictive model in which 1.0 signifies a 100 percent chance of being hospitalized in the next year and 0.1 means a 10 percent chance. Patients at .35 and above are accepted into the high-risk team. One patient is at 0.8, with the average about 0.4, demonstrating that these are very complex patients. All visits are at home, which limits the size of the panel. An evaluation found that compared with patients who were eligible for the high-risk team but declined, those cared for by the high-risk team had a reduction in hospital use, emergency department use, and total hospital expenses, but with small numbers, the changes are not yet of statistical significance.

Capital Health Plan:

The concept of a separate primary care practice for patients at high-risk, with risk measured by predictive models, was pioneered by Capital Health Plan in Florida. The health plan's Center for Chronic Care (a high-risk clinic) is designed for the 1 percent of the health plan's enrollees who accounted for 25 percent of expenditures. Patients choosing the Center leave their established physician. Opened in 2003, the Center for Chronic Care is led by a geriatrician working with two RNs and one clerical staff person who care for about 300 patients. This team works with patients to create a care plan that is updated regularly. The Center offers same day access, with visits as long as needed. Clinical outcomes and patient quality of life scores improved compared with scores on admission to the Center. Hospital admissions, emergency department visits and total costs were substantially lower for Center for Chronic Care patients compared with patients cared for by traditional primary care.

North Carolina Medicaid:

For 10 years, the North Carolina Medicaid program has been implementing a care management program in 1,200 primary care practices for patients with multiple emergency department visits, many medications, or diagnoses of asthma, diabetes or congestive heart failure. Some of these are patients with complex health care needs, some are not. Care managers are based in regional offices across the state and work closely with a number of small primary care practices. The program has reduced emergency department visits and hospitalizations, particular for children with asthma, saving the North Carolina Medicaid program tens of millions of dollars annually (105). Medicaid plans from several states are exploring the potential of care management to reduce the costs of high-utilizing patients (110).

Urban Medical Group:

Urban Medical Group in the Boston area is a private nonprofit group practice committed for 30 years to the care of patients with complex health care needs and serious disabilities. The Urban Medical model is based on teams of physicians and nurse practitioners (NPs). Great emphasis is

placed on prompt access to care, including nights and weekends, and continuity of care with a physician/NP team. Much of the care is delivered by nurse practitioners making home visits to patients unable to travel – in homes, assisted living facilities and nursing homes. The house call program will see patients on the day they call, endeavoring to treat disease exacerbations quickly before they require an emergency department visit or hospital admission. The average nurse practitioner's caseload is 50 to 65 patients depending on their frailty. Difficult cases are discussed in team meetings. An internal evaluation found that among home visit patients, hospital admissions were reduced by 29 percent and hospital days by 34 percent during the patients' first year in Urban Medical, as compared with the previous year (78). Total costs of Urban Medical patients are considerably lower than the expected costs of similar patients; a more detailed study is currently under way. In 2009, Urban Medical Group was taken over by Beth Israel Deaconess Medical Center and was renamed BIDMC in Jamaica Plain.

Veterans Health Administration:

The Veterans Health Administration (VHA), a national integrated delivery system, has invested substantial resources in the care of geriatric patients, a number of whom have complex health care needs and high costs. Similar to the Kaiser statistics, 1 percent of VHA patients account for 30 percent of the system's costs. Several programs target these patients. Complex patients discharged from a hospital may be referred to home-based primary care, which takes the place of office-based primary care for these patients. Home visits are made by RNs under a physician's supervision, with back-up from social workers, physical and occupational therapists. Internal data suggest that patients in home-based primary care have lower readmission rates than those in traditional primary care. Each RN has a caseload of about 28 patients.

Another VHA program is geriatric primary care, comprised of high-risk clinics with geriatricians, designed for very frail patients who are not homebound. Traditional primary care physicians can transfer patients to geriatric primary care or can obtain consultation from geriatric primary care. While traditional primary care panel sizes range from 1,000 to 1,200, geriatric primary care clinics average a panel size of 700. Visits last 30 to 60 minutes. Data suggest that patients in geriatric primary care have better functional outcomes and lower readmission rates than patients in traditional primary care, but no controlled studies have been done.

SCAN Health Plan:

The SCAN Health Plan (originally called the Senior Care Action Network) is a Medicare Advantage HMO serving over 100,000 Medicare beneficiaries. SCAN has implemented a variety of programs for complex patients including RN care management in primary care, Coleman's Care Transitions Intervention, home care, and a high-risk clinic. The number of hospital bed days per 1,000 patients decreased markedly following the implementation of these programs. The high-risk clinic targets very complex patients and provides a multidisciplinary team of physician, nurse practitioner, RN, medical assistant and social worker for 325 patients. Patients are offered the choice of remaining with their regular primary care physician and additionally receiving the high-risk clinic services or transferring all care to the high-risk clinic.

PeaceHealth:

PeaceHealth is an integrated delivery system with facilities in Alaska, Washington and Oregon. The PeaceHealth Medical Group in Oregon utilizes RN or social worker care managers, each supporting 7 to 8 physicians. Each care manager has a caseload of 80 to 100 active patients. Care managers do home visits, see patients in the practices, and interact with them by telephone.

Appendix III Descriptions of care management programs

The care managers have acted as the eyes and ears for primary care physicians, learning when patients are worsening before it is too late. In addition, the PeaceHealth Oregon region operates a Senior Health and Wellness Center, with geriatricians, nurse practitioners, a social worker care manager and multidisciplinary team. Compared with traditional primary care patients receiving care management and with primary care patients without care management, Senior Health and Wellness Center patients, who are more complex, have better health-related quality of life despite the fact that virtually all declined in physical function. The Senior Health and Wellness Center is an example of a high-risk clinic. The care management provided by the PeaceHealth Medical Group is largely un-reimbursed; these programs could not survive financially without the support of the larger PeaceHealth organization.

Appendix IV Summaries of selected controlled studies

Author	Institution	Study design	Sample size	Patient characteristics	Intervention	Results
Sylvia (110); Boyd (16)	Primary care practice associated with Johns Hopkins Community Physicians	Patients of 2 doctors received Guided Care (GC); patients of 2 doctors received usual care. Patients followed for 6 months.	75 in each group. However, less than half of those assigned to the GC group actually received the intervention.	Using a predictive model, the 18% with highest risk of incurring major costs were eligible, mean age 75, about 40% difficulty with activities of daily living	Intensive training of GC nurses; nurse makes initial home visit, prepares care plan with PCP and patient, follow-up home visit and phone calls as needed, training of patients/families in recognizing worsening symptoms, close collaboration of GC nurse, PCP and team.	GC patients had lower mean insurance expenditures, hospital admits, hospital days and emergency department visits, but not statistically significant.
Leff (62)	8 primary care practices near Baltimore	Cluster RCT, Guided Care (GC) vs. usual care. Final data not available.	433 GC, 402 usual care	Mean age 77, 46% African-American, high-risk of using many health services, 4.3 mean diagnoses, 50% difficulty with activities of daily living	Intensive training of GC nurses; nurse makes initial home visit, prepares care plan with PCP and patient, follow-up home visit and phone calls as needed, training of patients/families in recognizing worsening symptoms, close collaboration of GC nurse, PCP and team.	GC patients twice as likely to rate care as high quality; doctor satisfaction higher in GC group. Hospital days reduced by 24% and health care costs by 11% in GC group, results not statistically significant. Final results in 2011.
Counsell (31)	6 community health centers associated with Indiana Univ. School of Medicine	RCT of Geriatric Resources for Assessment and Care of Elders (GRACE) vs. usual care. Patients followed for 24 months.	474 in GRACE, 477 in usual care	Mean age 72, about 60% African-American, 72% household income <$10,000/year, 52% fair or poor health, multiple diagnoses, 25% high-risk of hospitalization	Advanced practice nurse and social worker care manage patients together with PCP, geriatrician, and geriatrics team. Yearly home assessments, care plans related to 12 issues (e.g., pain, falls, incontinence, dementia), team meetings to review patients, at least 1 phone or face-to-face contact each month.	GRACE patients had significant improvements in quality of life compared with usual care; also had significant reduction in emergency department visits. Hospital admissions were not significantly different between the 2 groups, but the 25% of patients at highest risk had significantly fewer hospital admits.
Dorr (40)	13 clinics belonging to Intermountain Health Care in Utah	Controlled trial, not randomized, comparing 7 Care Management Plus (CMP) clinics with 6 control clinics. Patients followed for 24 months.	1144 in CMP, 2288 controls	Mean age 76, 95% white, 75% 2 or more diagnoses, 49% with diabetes, 23% hospitalization and 36% emergency department visit in previous year	Intensively trained RN care managers who did patient assessment, formulated care plan with the primary care team, performed home visits, clinic visits and phone calls as needed. Care managers worked closely with PCPs, and documented their work on a sophisticated computerized information system.	Mortality was lower in the CMP group, but not statistically significant; however, in the subgroup with diabetes, mortality was significantly lower in the CMP group. Hospital admissions in the CMP group were significantly lower for the subgroup with diabetes. Those with diabetes had higher risk scores than those without diabetes.

Appendix IV Summaries of selected controlled studies

Author	Institution	Study design	Sample size	Patient characteristics	Intervention	Results
Rich (86)	Jewish Hospital at Washington University Medical Center, St. Louis	RCT of intensive care management by multidisciplinary team vs. usual care. Patients followed for 90 days.	Care managed group 142, controls 140	Mean age 79, over 50% nonwhite, CHF plus other diagnoses, moderate functional impairment	In-hospital intensive education by team, intensive follow-up with home visits and phone calls. Lead person was RN care manager.	Significant reduction in readmissions in care managed group, reduction in overall costs, and improvement in quality of life.
Coleman (27)	Kaiser/ Colorado	RCT of Care Transitions intervention vs. usual care. Patients followed for 180 days.	Intervention group 360, control group 352	Mean age 76, 40% fair or poor self-reported health status, patients had one or more of 11 serious diagnoses	Advanced practice nurses (transition coaches) received intensive training in coaching patients and families to actively participate in their care. 5 contacts between coach and patient/family — 1 in-hospital, 1 home visit, 3 phone calls.	Intervention patients had significantly lower rehospitalizations at 90 days. Mean hospital costs were significantly lower for intervention patients at 180 days.
Naylor (73)	University of Pennsylvania Health System	RCT of hospital-to-home care management vs. usual care. Patients followed for 24 months.	Intervention group 177, control group 186	Mean age 75, 45% African-American, 42% income <$10,000, 56% fair or poor health, average 5 diagnoses and 5 medications	Advanced practice nurses provided comprehensive discharge planning, at least 2 home visits with more as needed, and at least weekly phone calls.	Readmissions and total costs to Medicare significantly reduced in intervention group. No differences in functional status or patient satisfaction.
Naylor (74)	6 Philadelphia hospitals	RCT of hospital-to-home care management vs. usual care. Patients followed for 12 months.	Intervention group 118, control group 121	Mean age 76, 36% African-American, about 40% with income <$10,000, 98% in fair or poor health, all patients had CHF plus an average of over 5 other diagnoses	Advanced practice nurses, trained for 2 months, provided daily in-hospital visits, at least 3 home visits, and phone encounters.	Intervention group patients had significantly fewer readmissions and costs. Quality of life and patient satisfaction were greater in the intervention group but these were only measured for 12 and 6 weeks, respectively.

Appendix V Summary of Medicare care management demonstrations

Name and year of demonstration	Year	Purpose	Summary of demonstration	Summary of results and outcomes	Which sites had success?
Medicare Case Management Demonstration[1,2]	1995	To study the effect of case management for beneficiaries with catastrophic illnesses and high costs.	Implemented in 3 sites between 10/93 and 11/95. Interventions focused on education regarding patient monitoring and management of target chronic condition.	The evaluation by Mathematica Policy Research, Inc. found that populations were successfully identified but projects had low levels of enthusiasm. Beneficiary participants had high satisfaction but projects did not improve self-care, health outcomes or cost. This was the first of the Medicare chronic care initiatives. Lack of financial incentives, physician involvement, and case management training were viewed as reasons for poor outcomes.	Target conditions and case management protocols differed by site but no site was able to improve health or cost outcomes.
Medicare Coordinated Care Demonstration[3]	2001	To examine whether care coordination services to beneficiaries with complex chronic conditions can reduce hospitalizations and improve health outcomes and/or costs.	Fifteen sites, representing a wide geographic region and including 5 disease management companies, were selected and began implementation on a rolling basis in April 2002. While care coordination services varied significantly among sites, the basic intervention included nurses providing patient education on self-management and adherence as well as health monitoring, primarily via telephone. Most sites also focused on improving communication between patients and physicians.	Evaluation conducted by Mathematica Policy Research, Inc. Thirteen of the 15 sites showed no significant reduction in hospitalizations. Treatment group participants were more likely to report receiving health education and care arrangements but no more likely to improve self-management activities or adherence. Results for specific health services, including prevention measures, and outcomes were less significant between treatment and control and more varied among sites, but no overall improvement in behaviors or quality of life was demonstrated. Physicians surveyed had positive feedback on the programs and its benefits, but did not believe that interventions improved their patients' self-management behavior.	Mercy Medical Center in Iowa and Georgetown University demonstrated statistically significant reductions in hospitalizations. Two programs — Mercy Medical Center and Health Quality Partners in Pennsylvania — produced monthly Medicare expenditures between 9% and 12% less than the control group. Only Health Quality Partners, however, was able to offset fees with this expenditure savings while sustaining care coordination activities. Health Quality Partners and Mercy had the most significant quality differences between control and treatment groups. Treatment group participants reported higher rates of receiving health education and satisfaction with care. Based on the findings of this evaluation, and evidence of potential cost savings or budget neutrality, these 2 sites were granted 3-year extensions, with interim results expected in 2010.
Medicare BIPA Disease Management Demonstration[1, 2]	2003	Provide disease management and prescription drug benefits for 30,000 Medicare beneficiaries.	Three sites in Louisiana, Texas and California/Arizona operated by commercial disease management companies were selected, and the project commenced in Spring 2004. However, due to unanticipated difficulties identifying and enrolling patients, the demonstration did not continue to conclusion.	This demonstration did not continue to conclusion.	Not applicable.

Appendix V Summary of Medicare care management demonstrations

Name and year of demonstration	Year	Purpose	Summary of demonstration	Summary of results and outcomes	Which sites had success?
Community Nursing Organization Demonstration[1, 2]	2003	Test a capitated, nurse-managed system of care that provides community-based services and case management.	Nurse care managers at four selected sites provided care coordination, including health education and prevention services, to Medicare beneficiaries selected to participate.	Average spending was significantly higher for groups who received the intervention. Average monthly Medicare expenditures increased at a faster rate in these treatment groups than in the general population. One site had a slightly higher hospitalization rate for the treatment group, but there was little analysis of quality outcomes. This demonstration focused on cost savings and did not analyze quality outcomes for beneficiaries who received community nursing services.	All sites had higher Medicare spending for treatment groups.
Medicare Home Health Independence Demonstration[1, 2]	2004	Assess the cost and quality outcomes of allowing beneficiaries with severe or complex chronic conditions to be deemed homebound in order to receive Medicare home health services that would not otherwise be granted.	A two-year demonstration with sites selected in Massachusetts, Missouri and Colorado. The target group was beneficiaries with severe or debilitating illness who might be in nursing home care were it not for advancements that allowed them to live at home and have a small degree of mobility. Despite Medicare's stipulation of 15,000 participants, due to strict enrollment criteria, sites were ultimately able to enroll only 58 beneficiaries.	Evaluation conducted by Mathematica Policy Research, Inc. Due to the low enrollment, the evaluation focused on causes and barriers to sufficient enrollment. Analysis of those who did participate found that the average number of home visits doubled for participants during the four-month period after enrollment. The differences between hospital admissions and Medicare expenditures were insignificant between the four months prior to enrollment and the four months after enrollment. It was determined that participants represented a highly complex, high-cost group of beneficiaries (average number of diagnoses in prior year was 10) with greater needs than the average Medicare recipient who received home care services. Because of the low enrollment, it was difficult to draw conclusions regarding long-term cost and quality outcomes.	The evaluation focused on the demographics and experiences of individual enrollees. The programs with enrolled patients were disproportionately rural and non-profit.
Care Management for High-Cost Beneficiaries Demonstration[1, 2]	2005	Study different models of care management for high-cost beneficiaries using provider-directed care coordination programs.	During this three-year demonstration, each of six selected sites received a monthly fee per participant, under the condition that the site must achieve overall program savings or the fee would be returned. Sites implemented a variety of care management services, such as home support, prevention interventions, 24-hour nurse lines, and telephone services.	Three of the four sites remaining at the three-year mark were granted three-year extensions, based on preliminary positive outcomes and projected financial savings, however the official evaluation of the first three years has not yet been released.	The Key to Better Health Program (a division of Village Health in New York state), the Massachusetts General Care Management Program, and the Health Hero Network's Health Buddy Project (in Oregon and Washington) all demonstrated positive quality outcomes and cost neutrality or savings through care management activities.

Appendix V Summary of Medicare care management demonstrations

Name and year of demonstration	Year	Purpose	Summary of demonstration	Summary of results and outcomes	Which sites had success?
Medicare Health Support Demonstration[1, 2]	2005	A two-phase project, phase 1 including a three-year pilot of care management interventions for beneficiaries with heart failure or diabetes.	Mandated by the 2003 Medicare Modernization Act, phase 1 of this demonstration developed programs operated by commercial disease management companies to help patients with adherence to physician's care plans as well as teach self-management and lower hospitalizations and overall health risks. Eight sites were selected and five remained active by the completion of phase 1 in 2008, with approximately 68,000 beneficiaries participating.	A 6-month phase 1 report to Congress, prepared by RTI International, found little difference in beneficiary satisfaction between treatment and control groups. While statistical testing was not conducted after the six-month pilot period, no difference was found in care plan adherence between groups. Hospitalization rates declined slightly for both treatment and control groups. The preliminary analysis indicated that the most costly beneficiaries had not been enrolled as participants, and that no cost savings or budget neutrality had been achieved. The final report is due by February 2013.	Evaluation not yet available.
Medicare Care Management Performance Demonstration[1, 2]	2006	To advance the use of health information technology as a means of improving quality of care for beneficiaries with chronic illness.	The interventions were implemented at sites in California, Massachusetts, Utah and Arkansas, with approximately 650 practices participating overall.	The demonstration is measuring clinical quality outcomes related to diabetes, heart failure, CAD, as well as preventive screenings. The final evaluation will also assess financial incentives for various performance improvement interventions. The demonstration is ongoing and the evaluation is being conducted by Mathematica Policy Research, Inc. The 1-year post-demonstration report to Congress will be released in Spring 2010.	Evaluation not yet available.
Medicare Medical Home Demonstration[1, 2]	2007	Evaluate the provision of care coordination and care management services to high-risk/high-cost populations with complex chronic illness in a medical home setting.	Qualified medical home practices in eight geographic areas will receive monthly payments for care interventions and medical home services. The demonstration design, prepared by Mathematica Policy Research, Inc., outlines the expected processes for enrollment and transitions to care interventions for selected sites.	Enrollment at sites in up to 8 states is expected to begin in November 2009.	Evaluation not yet available.

1 Centers for Medicare & Medicaid Services (CMS), Demonstration Projects & Evaluation Reports. Accessible at: (*http://www.cms.hhs.gov/DemoProjectsEvalRpts/MD/list.asp?listpage=1*).

2 Guterman S, Serber MP. "Enhancing Value in Medicare: Demonstrations and Other Incentives to Improve the Program." *Prepared for the Commonwealth Fund/ Alliance for Health Reform 2007 Bipartisan Congressional Health Policy Conference*, January 2007. Accessible at: *(http://www.commonwealthfund.org/~/media/Files/Publications/Fund%20Report/2007/Feb/Enhancing%20Value%20in%20Medicare%20%20Demonstrations%20and%20Other%20Initiatives%20to%20Improve%20the%20Program/990_Guterman_enhancing_value_Medicare%20pdf.pdf).*

3 Peikes D, Chen A, Schore J, Brown R. "Effects of Care Coordination on Hospitalization, Quality of Care, and Health Care Expenditures Among Medicare Beneficiaries." *Journal of the American Medical Association*, vol. 301, no. 6, 2009.

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