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The Elusive Quest for Quality and Cost Savings in the Medicare Program

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MEDICARE IS A DOMINANT FORCE IN THE HEALTH care system of the United States. When it was launched as a national social insurance program for elderly and disabled Americans in 1965, Medicare was grafted onto the existing health care delivery system. Over the past 40 years, most physicians and hospitals have continued to receive regulated payments from Medicare with no limits on the volume of services provided and minimal oversight or coordination of care. In 2009, Medicare expenditures will exceed \$400 billion, representing 13% of the federal budget and about one-fifth of all US expenditures on health care.¹

This status quo, however, is not sustainable for Medicare. Last year, the Medicare trustees projected that the Hospital Insurance Trust Fund will be exhausted in 2019 without new measures to increase payroll taxes or contain the growth of expenditures.¹ In response to similar concerns during the past decade, policymakers have started to implement and evaluate numerous new approaches to contain costs while maintaining or improving the quality of care in Medicare. These demonstration projects have tried to modify how care is coordinated or instituted new financial incentives for physicians and hospitals.²

A study reported by Peikes and colleagues in this issue of JAMA presents one of the most comprehensive evaluations of a Medicare demonstration project to date.³ In 2002, 15 programs were independently funded by the Centers for Medicare & Medicaid Services (CMS) to participate in the Medicare Coordinated Care Demonstration. The goals of the project were to determine whether enhanced care coordination could improve the quality of care or reduce Medicare expenditures for participating beneficiaries with serious chronic health conditions.

With voluntary enrollment of more than 18 000 participants from all US regions, these 15 programs implemented a varied set of approaches to improve care coordination. Common features of the programs included the use of nurses trained as care coordinators to interact on a regular basis with patients who had serious chronic health conditions. These nurses provided patients with health education and

sent written reports to their physicians. Participants were substantially sicker than Medicare beneficiaries in general, with much higher rates of cardiovascular disease, diabetes, and chronic lung disease, and correspondingly greater monthly Medicare expenditures before enrollment (\$1535 vs \$551, respectively). The CMS paid each program a negotiated monthly fee that averaged \$235 per participant to provide outreach, health education, and support to these chronically ill patients—and in some cases to their physicians. An independent evaluation of these programs was funded by CMS to assess their effects on quality of care, hospitalizations, and Medicare expenditures in a consistent and rigorous manner.

The program evaluation reported in this issue of JAMA³ has several strengths that merit highlighting. First, participants in each program were randomly assigned to interact with a care coordinator or to receive their usual care, ensuring that observable and unobservable characteristics were well balanced between intervention and control groups within each program. Second, complete Medicare claims data and nearly complete patient survey data were available to assess hospitalizations, expenditures, participants' functional status, and an array of technical and patient-centered measures of quality of care. Third, 12 of the 15 programs had sufficient numbers of enrollees to detect a 20% change in rates of hospitalization and in Medicare expenditures during a 4-year period with reasonable statistical power.

The financial and clinical results of this careful evaluation were sobering. Only 2 of the 12 largest programs had a statistically significant effect on the annual number of hospital admissions. A hospital-sponsored program in Iowa (Mercy Medical Center) significantly reduced hospitalizations by 17%, with a nonsignificant 9% reduction in Medicare expenditures. In contrast, a retirement center program in Maryland (Charlestown) significantly increased both hospitalizations and expenditures by 19%. When program fees were incorporated in the analysis, total expenditures were 8% to 41% higher ($P < .10$) in the intervention groups

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than the control groups for 9 of the 12 largest programs, and no programs reduced expenditures. In the clinical domain, the interventions had only sporadic effects on process measures of quality of care, such as vaccinations, cancer screening, or diabetes services, and had minimal or no effects on patients' functional status and health-related quality of life.

The only components of the evaluation for which most of the programs had substantial positive effects were in patients' reports of receiving help to arrange care and receiving teaching about diet and exercise from care coordinators. Despite this increased teaching, patients' health behaviors related to diet and exercise did not notably differ between the intervention and control groups in the 12 largest programs. These findings suggest that teaching on these topics by care coordinators was no more effective in modifying patients' behaviors than usual care.

Based on the increased Medicare expenditures related to program fees and the largely null effects on quality of care and health outcomes, CMS terminated all but 2 of the 15 programs when the evaluation was completed. Two programs selected to continue were judged to have the potential to generate sufficient savings from less frequent hospitalizations to offset their program fees. Despite the largely null effects of the demonstration project as whole, the evaluation offers 2 important insights to guide Medicare policy on coordination of chronic disease care going forward.

First, care coordinators must interact in person with patients and not simply educate or assist them by telephone. Only 4 of the 15 programs emphasized in-person contact between coordinators and participants, including both of the programs that CMS allowed to continue. The value of in-person contact is consistent with findings from a recent pooled analysis of 10 randomized studies of care management for congestive heart failure, in which such contact between care managers and recently hospitalized patients reduced subsequent readmissions, but telephone contact did not have a significant effect.⁴ This pooled analysis also found that a team-based approach, but not an individual care manager, resulted in fewer readmissions than usual care.

A second crucial lesson is that care coordinators must collaborate closely with patients' physicians to have a reasonable prospect of influencing care. Only 4 of the 15 programs had coordinators who were based in physicians' offices or who attended patients' medical appointments, including both of the programs that were authorized by CMS to continue. Ironically, in surveys of participating physicians,⁵ the 2 programs that were viewed most favorably by physicians, Mercy Medical Center and Charlestown, were the only ones that had statistically significant effects on hospitalizations, albeit in opposite directions as noted above. This paradox may have arisen in the Charlestown program because it served the oldest patients of any program—approximately 44% were aged 85 years or older compared

with only 15% across all 15 programs. Efforts to improve care coordination or access to primary care may sometimes lead to increased rates of hospitalization without measurable effects on health-related quality of life, particularly among very old or severely ill patients.⁶ Consistent with this observation, from the 2 programs that demonstrated the potential to reduce hospitalizations, the authors concluded that patients with intermediate average costs (approximately \$1000 per month), not those who were relatively healthy or extremely sick, were most likely to experience fewer hospitalizations.

To engage physicians and medical groups as serious partners in efforts to improve quality and contain costs, CMS will need to provide stronger financial incentives in Medicare—beyond traditional fee-for-service payments. Another ongoing Medicare project, the Care Management for High-Cost Beneficiaries Demonstration, is assessing the effectiveness of clinician-directed chronic care management programs. A variety of approaches focused on improving care coordination and home support through patients' own health care practitioners are being tested in 6 sites across the country.² Many of these approaches are consistent with new models for patient-centered medical homes that have been endorsed by leading professional organizations in primary care.⁷ In addition, CMS is now developing plans to launch the Medicare Medical Homes Demonstration that will pay monthly fees of \$40 to \$100 per patient to 2000 physicians to coordinate the care of their chronically ill beneficiaries.⁸ By involving patients' own physicians in coordinating their care, these programs hold greater promise for achieving better quality of care and possibly cost savings. Such efforts in the traditional Medicare program should also be compared with similar efforts under way in private health plans that participate in the Medicare Advantage program. As was done with the Medicare Care Coordination Demonstration,³ CMS must continue to fund rigorous independent evaluations of new demonstration projects to assess their effectiveness, including potentially unintended consequences such as more frequent hospitalizations.

Although these demonstration projects are essential opportunities to test and learn how the provision of services to Medicare beneficiaries can be improved, they will not achieve sufficient cost savings to solve the stark fiscal problems of the Medicare program in the next decade. The Congressional Budget Office recently estimated that offering the new medical home model for all chronically ill Medicare beneficiaries would increase Medicare expenditures by \$5.6 billion from 2010 through 2019.⁹ Such an investment would be worthwhile if it improves the quality of care and health outcomes. Balancing the Medicare budget, however, will require much more difficult political decisions among less appealing choices—raising payroll taxes to support Medicare, increasing beneficiary cost-sharing, reducing benefits, or cutting payments to physicians, hospitals, and health plans, particularly for services

that are not clearly beneficial. The fiscal health of Medicare and the federal government will hinge on the new president and Congress making these difficult decisions wisely.

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Taking Control of Prosthetic Arms

Gerald E. Loeb, MD

PROSTHETIC LIMBS AIM TO REPLACE WHAT IS MOST OBVIOUSLY missing—the mechanical function and physical appearance of bones, muscles, and skin. Mechatronics—the fusion of advanced motors, electronics, and servocontrol and power systems—is enabling the development of highly articulated prosthetic limbs capable of complex movements. But still missing are the parts that cannot be seen—the bidirectional flow of information between the limb and the central nervous system, which enables dexterous movements.¹ The absence of interfaces with the nervous system has been less of a problem for advanced lower-extremity prostheses, because the functional abilities of these prostheses are much more limited and because these devices can take cues by sensing mechanical events initiated by the intact parts of the body (eg, stump and contralateral leg).² Failure to develop practical neural interfaces for command and sensation in the upper extremity will lead to a repeat of the early disappointment with myoelectric arms.³ Those limbs were (and continue to be) difficult to control, requiring intense user concentration to move one joint at a time with little or no control of velocity or force.

The paradox for myoelectric control is that as more control is needed, fewer myoelectric channels are available. Higher levels of arm amputation mean fewer separately recruited bits of muscle, and their natural functions are more remotely related to those being replaced by the mechatronic limb. Kuiken et al⁴ pioneered a way around this paradox by rewiring the neuromuscular innervation, following

up on a suggestion made in passing in an early review of potential approaches to this problem.⁵

In this issue of *JAMA*, Kuiken et al⁶ describe the use of the advanced signal processing required to convert easily recorded multichannel electromyogram signals into functionally useful postures and movements of advanced prostheses with multiple actuators. The speed as well as accuracy of the movements represent substantial improvements over previous myoelectric systems. Even more important, however, is the ease with which patients learned to perform tasks requiring coordinated motion in more than one joint. This substantial advance reflects the synergy of simultaneous improvements to both the signal source and the processing algorithms.

Targeted muscle reinnervation (TMR) techniques are producing promising results, but several obstacles may hamper their widespread clinical deployment. Prosthetic system design must be tailored for each patient, and surgical technique will have significant effects on results obtained, as noted in the report by Kuiken et al.⁶ Targeted muscle reinnervation involves substantial surgery and recovery time for reinnervation, although this could be integrated with the initial amputation and repair procedures in at least some patients.

Selecting postures and movements for the unloaded limb is only the first step in developing a command and control system in which the mechatronic limb can interact in a forceful but compliant manner with external objects. The command signals from reinnervated muscles (or any other source) will have to be integrated electronically with the prosthetic equivalent of somatosensory feedback. During the devel-

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