GERIATRICS IN MANAGED CARE

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# The Effect of Case Management on the Costs of Health Care for Enrollees in Medicare Plus Choice Plans: A Randomized Trial

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**OBJECTIVE:** To measure the effects of case management on an older population's costs of health care.

**DESIGN:** A 1-year randomized controlled trial.

**SETTING:** Multiple sites of care in San Francisco, California.

**PARTICIPANTS:** Patients aged 65 or older of primary care physicians in a large provider organization bearing financial risk for their care (n = 6409).

**INTERVENTION:** Screening for high risk and provision of social work-based case management.

**OUTCOME MEASURES:** Volume and cost of hospital, physician, case management, and other health-related services.

**RESULTS:** The experimental group used more case management services than the control group (0.09 vs 0.02 months per person, $P < .001$). The experimental group's average total payments for health care were slightly lower ($3148 vs $3277, P = .40).

**CONCLUSIONS:** This study provides no statistically significant evidence that social work-oriented case management reduces the use or the cost of health care for high-risk older people. Other potentially favorable effects of this type of case management need to be evaluated, as do the effects of other types of case management. **J Am Geriatr Soc 48:996–1001, 2000.**

**Key words: case management; screening; health services research; randomized trial; aged**

In attempting to ameliorate the fragmentation, disorganization, inefficiency, and frequent ineffectiveness of the health care of sick and disabled older people, many organizations have sought to link medical, social, and family resources through case management.[1] Typically, case managers are social workers or nurses who coordinate and monitor the health-related services of their clients.[2,3] The specific duties and methods of these case managers vary widely from program to program, but they often involve assessing the client's needs, creating a plan of care, coordinating services, monitoring progress, and adjusting the plan as needed. A few case management programs hire only social workers and restrict their focus to accessing and coordinating supportive services. Others rely solely on nurses and focus on their clients' medical and health education needs. Most programs, however, attempt to improve both supportive and medical care: many employ both social workers *and* nurses, and a few train technicians from other backgrounds to be case managers.[4]

The most common goals of case management are limiting expenditures for care in hospitals and nursing homes and improving clients' quality of life and satisfaction with health care. Accordingly, case management is typically offered to those older people thought to be at greatest risk of poor outcomes or high costs of care, i.e., those with chronic diseases, those taking several prescription medications, those with functional disability, those who use healthcare services heavily, and those lacking needed assistance from family or friends. Healthcare organizations identify such potentially appropriate recipients of case management through referrals, client surveys, and analysis of administrative data.[5]

Despite the ubiquitous presence of case management programs in the Medicare managed care industry,[4] unbiased evidence of their cost-effectiveness is sparse. The National Long-Term Care (Channeling) Demonstration showed that case management and access to supplemental community services satisfied clients but cost more than they saved in expenditures for nursing home care.[6] Later studies claimed that more carefully targeted case management programs saved money by reducing use of hospitals by high-risk older persons,[7,8] but weaknesses in study designs make these findings vulnerable to powerful biases. A more rigorously evaluated case management program for older people who had been hospitalized for congestive heart failure (CHF) also reported success.[9] Using standard protocols for educating and supporting participants in the hospital and at home, case

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management by an interdisciplinary team (a nurse, a dietician, and a social worker) reduced hospital readmissions for CHF by 56%. More recently, a randomized trial showed that a targeted program of disability prevention, self-management, and case management by a geriatric nurse practitioner preserved functional ability and reduced hospital days significantly.[10] However, another randomized trial of nursing-oriented case management of frail older people failed to improve function, quality of life, satisfaction with care, or hospital days.[11] A Medline search from 1986 to 1999 identified additional case studies but no reports of other well controlled studies of the effects of case management for older people.

Brown and Toland Medical Group (BTMG), formerly California Pacific Medical Group, is a physician-owned, multi-specialty, independent practice association (IPA) in San Francisco, California. At the time of this study, BTMG was composed primarily of small practices, including about 500 specialists and 200 primary care physicians who saw adults (85% internists and 15% family physicians; 4% board-certified in geriatrics). Under capitated contracts with six health maintenance organizations (HMOs), BTMG provided care for more than 10,000 older Medicare beneficiaries. Financial risk for care was shared by BTMG and its affiliated hospital, the California Pacific Medical Center (CPMC). In 1994, an internal study revealed that 10% of BTMG's capitated Medicare beneficiaries incurred 75% of the group's annual health care costs; 20% incurred 87% of the group's costs.

In response, BTMG sought to determine whether case management of its high-risk older patients could help contain the costs of their care. Believing that unmet needs for social services contributed to poor health and avoidable healthcare expenditures, it designed a case management program that attempted to identify high-risk patients proactively and to provide them with home-based, social work-oriented case management through a community social service agency, Seniors-At-Home (SAH), a division of Jewish Family and Children's Services of San Francisco. BTMG hypothesized that an older population served by a targeted case management program would use fewer health-related resources than would such a population receiving usual care. This paper reports the effects of this Identification and Early Intervention (IEI) program during the first 12 months of its operation.

## METHODS

### Study Design

The investigators conducted a randomized controlled trial to measure the effects of the IEI program on its older patients' health care costs. All BTMG primary care practices were invited to participate in the study. Practices that responded affirmatively (including all physicians and all of their patients aged 65 or older) were assigned randomly to either the experimental group, in which the IEI program was implemented, or the control group, in which usual care (which could include case management) was continued.

### The Experimental Intervention

The IEI program relied on three methods for identifying older persons who were at risk for suboptimal use of needed social services and, thereby, for high medical costs. During the first half of 1995, SAH trained at least one member of the office staff (e.g., an office assistant, receptionist, or nurse) of each experimental practice to function as a geriatric resource person (GRP). The GRP's role was to identify older patients visiting the office who might benefit from case management by SAH. GRP training included six 90-minute introductory classes followed by ongoing bi-monthly educational sessions designed to familiarize the trainees with the potential benefits of case management and to help them recognize patients with increasing frailty or deteriorating health status who might benefit from it. The GRPs were encouraged to use a low threshold for referring to case management all patients with new or worsening forgetfulness, deteriorating personal hygiene, or a pattern of missed appointments or increasingly frequent contacts with the office, as well as those who were simply "not doing as well as expected." Trainees received a $25 payment for each meeting attended.

A geriatric clinical nurse specialist (CNS) provided a second avenue for referral of high-risk persons to SAH. Relying on clinical judgment rather than specific protocols, she assessed all hospitalized BTMG patients to identify those whose probability of rehospitalization could potentially be reduced by additional social services and assistance at home. Typical examples included older patients with cognitive impairments and those returning home alone after hip fractures.

The third identification method was a mailed survey designed to monitor the status of all older people under the care of the BTMG primary care physicians, including those who rarely visited the physicians' offices. At the beginning of the study, BTMG mailed a cover letter and a six-page, 32-item questionnaire to each participant; it sent postcard reminders to nonrespondents. The questionnaire (available on request) included items from the SF-36,[12] the Pra (probability of repeated admission) instrument,[13–16] and the screening tool used by the Social Health Maintenance Organizations to address seven domains of information. BTMG sent experimental participants' responses to their GRPs and primary physicians in the form of computer-generated, one-page summaries that highlighted the person's Pra score and any individual responses suggestive of potential problems. BTMG sent similar summaries to the primary care physicians of participants in the control group. When a GRP detected patients who seemed to be at risk, through either their behaviors or their survey summary, she encouraged the primary physician to make referrals to SAH for more detailed in-home evaluations.

A SAH social worker visited the home of each BTMG patient referred from the geriatric CNS or a primary care office. There she evaluated the person's functional, cognitive, social, and medical status and determined, according to a standard protocol,[a] the need for specific levels of case management (i.e., none, low-, medium- or high-level). The social worker then communicated her findings and her suggested plan to the primary physician and the utilization management department of BTMG. After receiving BTMG's approval, she implemented the case management plan.

The goal of the SAH intervention was to connect older people with the family, community, and financial resources that could meet their needs. Through home visits and telephone contacts, the SAH case managers arranged and coordinated resources such as home care, transportation, meals,

[a] Available on request.

rehabilitative therapy, bill paying, and volunteer services until each client's situation stabilized.

### Financial Arrangements

More than 90% of the study patients were enrolled in Medicare HMOs with which BTMG had full-risk contracts. BTMG employed the hospital-based geriatric CNS, trained the GRPs, and conducted and reported the results of the survey to the primary care practices.

Brown and Toland Medical Group subcapitated the individual practices to cover primary care services; it reimbursed other providers of health care on a fee-for-service basis, including SAH for the case management it provided to study participants. CPMC reimbursed BTMG for the costs of the geriatric CNS, the training of the GRPs, the survey, and the SAH services. The individual practices were responsible for the salaries of their employees who functioned as GRPs.

The study participants who were referred to SAH were not billed for the SAH case management services they received, but they were responsible for the costs of community services such as home care (unless they qualified for public subsidies).

### Measures

The period of observation began on July 1, 1995, and ended on June 30, 1996. The survey provided baseline information about the sociodemographic, residential, health-related, functional, life-style, and affective characteristics of the patients of all participating practices. BTMG's payment records provided an accounting of most of each person's healthcare costs during the preintervention year (July 1, 1994, through June 30, 1995) and during the period of observation (July 1, 1995, through June 30, 1996). Included were payments for the participants' use of services provided by hospitals, specialist physicians, outpatient facilities, skilled nursing facilities, emergency rooms, ambulances, home health agencies, hospice programs, medical supply companies, laboratories, and the SAH case management program.

### *Analysis*

We analyzed person-level data according to the intention-to-treat principle, using *t* and chi-square statistics for continuous and categorical variables, as appropriate. We used multiple linear regression with logarithmic transformations and the Wilcoxon rank-sum test to evaluate the relationship between group assignment (case management or usual care) and payments for health services. We regarded $P < .05$ as statistically significant.

## RESULTS

Fifty primary care practices were offered the opportunity to participate in the study; 35 accepted. Of these, 16 practices (with a total of 3480 older patients) were assigned randomly to the experimental group and 19 practices (with 2929 older patients) to the control group.

The experimental and control groups' response rates to the mailed baseline questionnaire were 63.4% and 58.3%, respectively, but the age, sex, and previous payments for health care for the respondents and nonrespondents did not differ significantly. As shown in Table 1, the groups reported similar baseline characteristics, except that a higher percentage of the experimental group had advance directives, a history of colon cancer, and difficulty doing light housework and using a telephone. More control participants reported urinary incontinence. During the year before the observation period (July 1, 1994, to June 30, 1995), BTMG average total health care payments for the experimental group were higher than those for the control group, $2040 versus $1648 per person.

During the observation period (July 1, 1995, to June 30, 1996), SAH provided case management services to 3.2% of the experimental group (mean duration 3.0 months, mean payments $312) and to 0.7% of the control group (mean duration 2.1 months, mean payments $204). Within the experimental group, the recipients of case management were older and markedly sicker, more depressed, more anxious, more disabled, more medicated, and more likely to have lost weight and used health services in the past year than the nonrecipients. Use by the two groups as well as costs of other health-related resources are shown in Tables 2 and 3. BTMG's mean total healthcare payments, including those for SAH case management, were slightly lower for the experimental group ($3148 vs $3277 per person).

In order to address the skewness in the distribution of the 1995–1996 total healthcare payments and the possible confounding by differences between the groups' 1994–1995 total healthcare payments, we constructed a linear regression model of the relationship between group assignment and log-transformed total 1995–1996 payments, adjusting for total 1994–1995 payments. In this model, membership in the experimental group was associated with a small, statistically insignificant reduction in total health care payments ($P = .40$). The Wilcoxon rank-sum test also showed the IEI-related savings to be statistically insignificant ($P = .18$).

Certain other costs of providing the experimental intervention were not formally tracked as outcomes of the study. We estimate that the aggregate cost of the postal screening program, the training of the GRPs, and the salaries and benefits related to their new ongoing senior-specific activities was $25 to $30 per experimental participant.

## CONCLUSION

Debates about the value of case management for high-risk older people are often passionate. Most people who have experienced the fragmentation and inefficiencies of complex care for the chronically ill assert that coordination of care would help improve clinical outcomes and reduce health care costs. Most case managers suspect that it does. Econometricians, however, stress that many of the published studies of case management are biased and that, for several reasons,[17] the costs of case management programs have generally *not* been offset by savings in other types of care.

The present study is the first randomized comparison of targeted, social work-oriented case management and usual care. The results suggest that the IEI program was cost-neutral, but we should interpret these results carefully. The IEI program targeted and provided case management services to only 111 (3.2%) of the 3480 patients in the experimental group. Ideally, we would have compared the outcomes of these 111 with the outcomes of a similarly targeted, high-risk subset of the control group that was not offered case management. Unfortunately, the study design did not include an equivalent process for identifying such a subset of the control group, i.e., no CNS or GRPs attempted to identify high-risk patients in the control group who might benefit from case

**Table 1. Baseline Characteristics of Experimental and Control Respondents**

| | Experimental (n = 2206) | Control (n = 1708) | t/$X^2$ |
|---|---|---|---|
| Age (mean years) | 76.0 | 75.9 | −0.14 |
| Sex (% female) | 61.1 | 60.6 | 0.14 |
| Lives alone (%) | 34.2 | 34.6 | 0.08 |
| Exercise (days/week) | 3.6 | 3.4 | −1.64 |
| Cigarettes (mean no./day) | 1.2 | 1.0 | −1.09 |
| Alcohol (mean drinks/day) | 0.6 | 0.6 | −0.29 |
| Prescription medications (mean no./day) | 2.0 | 1.8 | −1.95 |
| Nonprescription medications (mean no./day) | 0.6 | 0.6 | −0.25 |
| General health is fair or poor (%) | 24.8 | 23.9 | 0.39 |
| Pra Score (mean) | 0.33 | 0.33 | 0.34 |
| Ever had (% yes) | | | |
| Asthma | 7.9 | 6.5 | 2.74 |
| Emphysema | 3.2 | 2.7 | 0.91 |
| Stroke | 6.3 | 7.2 | 1.40 |
| Breast cancer | 4.9 | 4.2 | 1.34 |
| Colon cancer | 3.7 | 2.5 | 4.09* |
| Cervical cancer | 2.0 | 2.0 | 0.01 |
| Depression | 14.1 | 15.8 | 2.24 |
| Coronary heart disease | 8.6 | 10.0 | 2.23 |
| In the previous 12 months, had (% yes) | | | |
| Arthritis | 36.6 | 35.2 | 0.84 |
| High blood pressure | 37.9 | 38.1 | 0.03 |
| Back problems | 23.0 | 21.7 | 0.92 |
| Diabetes | 9.1 | 8.2 | 0.89 |
| Fatigue | 17.1 | 15.9 | 0.96 |
| Difficulty chewing or swallowing | 4.5 | 3.6 | 2.24 |
| Ankle or leg swelling | 19.8 | 17.6 | 3.09 |
| Urinary problems | 17.9 | 19.8 | 2.28 |
| Dizziness | 14.3 | 14.3 | 0.01 |
| Blackouts | 2.2 | 2.6 | 0.53 |
| Diabetes | 7.3 | 7.5 | 0.06 |
| Heart problems | 12.1 | 13.0 | 0.70 |
| Breathing problems | 12.6 | 11.5 | 1.11 |
| Because of a health problem, has difficulty (% yes) | | | |
| Using the telephone | 6.7 | 4.8 | 5.73* |
| Doing light housework | 8.5 | 6.6 | 4.68* |
| Taking medicine | 4.1 | 3.2 | 2.29 |
| Using transportation | 11.6 | 11.0 | 0.43 |
| Running errands or getting to appointments | 11.2 | 10.5 | 0.44 |
| Preparing meals | 8.2 | 7.7 | 0.25 |
| Shopping for groceries | 11.8 | 11.1 | 0.48 |
| Paying bills or doing paperwork | 8.4 | 8.4 | 0.01 |
| Walking across room | 5.2 | 4.6 | 0.61 |
| Getting in and out of bed or chairs | 9.2 | 9.4 | 0.08 |
| Dressing | 6.2 | 5.3 | 1.42 |
| Bathing or showering | 7.3 | 6.9 | 0.17 |
| Using bathroom | 4.3 | 3.3 | 2.43 |
| Feeding yourself | 2.5 | 1.8 | 1.82 |
| Without aid, has difficulty with (% yes) | | | |
| Walking 1/4 mile | 19.1 | 20.8 | 1.67 |
| Climbing ten steps without resting | 16.8 | 16.1 | 1.20 |
| Stooping, crouching or kneeling | 27.0 | 28.1 | 0.58 |
| Using fingers to grasp or handle | 12.2 | 10.6 | 2.20 |
| Lifting and carrying 10+ lbs. | 23.6 | 24.1 | 0.10 |
| Poor ability to control urine (%) | 7.2 | 9.1 | 4.74* |
| Lost 10+ lbs. without trying in last 6 months (% yes) | 7.7 | 7.6 | 0.00 |
| Felt sad frequently during past month (%) | 16.2 | 17.7 | 1.36 |
| Has an advance directive (% yes) | 48.7 | 41.7 | 18.38** |

*$P < .05$. **$P < .0001$.

**Table 2. Mean Payments for Health Services: 7/1/95–6/30/96**

| | Experimental (n = 3480) | Control (n = 2929) |
|---|---|---|
| Hospital | $ 1096.84 | $ 1178.61 |
| Specialist physician | 783.53 | 827.29 |
| Skilled nursing facility | 376.43 | 471.45 |
| Lab tests, X-rays | 234.19 | 194.08 |
| Primary care physician | 191.60 | 184.82 |
| Ambulatory surgery | 141.29 | 132.10 |
| Ambulance | 58.33 | 66.82 |
| Home health | 85.03 | 66.44 |
| Emergency department | 49.66 | 53.40 |
| Medical equipment | 42.14 | 38.35 |
| Medications | 45.51 | 31.08 |
| Dialysis | 19.77 | 22.24 |
| PT/OT/speech therapy | 11.86 | 8.09 |
| Case management | 9.94 | 1.46 |
| Other | 1.61 | 0.98 |
| Total payments | $3,147.73 | $3,277.21 |

**Table 3. Use of Services: 7/1/95–6/30/96**

| | Units | Experimental (n = 3480) | Control (n = 2929) |
|---|---|---|---|
| Hospital | Days | 1.06 | 1.14 |
| Specialist physician | Visits | 9.00 | 9.01 |
| Skilled nursing facility | Days | 0.92 | 1.20 |
| Primary care physician | Visits | 3.99 | 4.10 |
| Ambulatory surgery | Visits | 0.13 | 0.10 |
| Ambulance | Trips | 0.38 | 0.46 |
| Home health | Visits | 1.14 | 0.95 |
| Emergency department | Visits | 0.49 | 0.49 |
| Dialysis | Visits | 0.19 | 0.20 |
| PT/OT/Speech therapy | Visits | 0.38 | 0.26 |
| Case management | Months | 0.09 | 0.02 |

management. Therefore, our primary analysis compared the total healthcare payments for *all* members of the experimental and control groups.

Thus, initially it remained possible that SAH case management actually had reduced expenditures for the high-risk subpopulation that it had targeted and that our primary analysis had simply failed to detect this effect because we had summed the healthcare payments for all members, targeted and nontargeted, of each group. To examine this possibility, we compared the 1995–1996 healthcare payments for high-risk experimental and control subgroups that we defined on the basis of high baseline Pra values, i.e., 0.50 or greater. The mean total healthcare payments in this experimental high-risk subgroup were similar to those in the control high-risk subgroup ($7762 vs $7869). In a linear regression model that adjusted for 1994–1995 payments, membership in this experimental high-risk subgroup was not a significant predictor of logarithmically transformed total payments in 1995–1996 ($P = .66$). Nevertheless, this subgroup analysis cannot not rule out the possibility that the IEI program might have saved money among the specific high-risk subpopulation that it targeted for case management.

Furthermore, the study's data collection system did not track death or disenrollment, so the analysis could not include the censoring of payment records. In addition, other important effects of case management – on clients' and families' health, function, affect, quality of life or satisfaction with health care, on physicians' satisfaction with practice, and on the community's perception of BTMG – were not measured in this study.

The small size of the aggregate savings observed in this study may also be related to the characteristics of the IEI model of case management, i.e., targeting by GRPs and a CNS and case management by social workers. Future research should evaluate the effects of evolving social work-oriented and alternative (e.g., nursing-oriented) models of case management that:

- Use specific protocols for identifying appropriate recipients of case management,
- Provide evidence-based, algorithm-driven, time-limited care for defined sets of conditions, and
- Maintain closer communication and more effective collaboration between case managers and primary care physicians.

A wide range of programs, all of which are now regarded as case management, undoubtedly have different potentials for improving health care. A new taxonomy for classifying different models of case management (e.g., according to programmatic goals, target population, nursing vs social work emphasis, background and training of case managers, role of case managers, case load, degree of standardization of interventions, financial incentives, and extent of integration with primary medical care) will be essential in the continuing investigation of the effects of case management on the health and costs of health care of older people.

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