Reductions in Costly Healthcare Service Utilization: Findings from the Care Advocate Program

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OBJECTIVES: To determine whether a telephone care-management intervention for high-risk Medicare health maintenance organization (HMO) health plan enrollees can reduce costly medical service utilization.

DESIGN: Randomized, controlled trial measuring healthcare services utilization over three 12-month periods (pre-, during, and postintervention).

SETTING: Two social service organizations partnered with a Medicare HMO and four contracted medical groups in southern California.

PARTICIPANTS: Eight hundred twenty-three patients aged 65 and older; eligibility was determined using an algorithm to target older adults with high use of insured healthcare services.

INTERVENTION: After assessment, members in the intervention group were offered mutually agreed upon referrals to home- and community-based services (HCBS), medical groups, or Medicare HMO health plan and followed monthly for 1 year.

MEASUREMENTS: Insured medical service utilization was measured across three 12-month periods. Acceptance and utilization of Care Advocate (CA) referrals were measured during the 12-month intervention period.

RESULTS: CA intervention members were significantly more likely than controls to use primary care physician services (odds ratio (OR) = 2.05, $P < .001$), and number of hospital admissions (OR = 0.43, $P < .01$) and hospital days (OR = 0.39, $P < .05$) were significantly more stable for CA group members than for controls.

CONCLUSION: Results suggest that a modest intervention linking older adults to HCBS may have important cost-saving implications for HMOs serving community-dwelling older adults with high healthcare service utilization. Future studies, using a national sample, should verify the role of telephone care management in reducing the use of costly medical services. **J Am Geriatr Soc 54:1102–1107, 2006.**

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Key words: managed care; care management; home- and community-based services

Medicare spending will likely double as a share of the economy by 2050, and government nursing home expenditures could triple over the same period.[1,2] As the population ages, even if disability rates decline, and there are indications that this may be occurring,[3] the likelihood is that there will be greater numbers, in absolute terms, of frail, older adults than ever before. Approximately 45% of the general population of the United States and almost nine of 10 adults aged 65 and older have at least one chronic condition.[4] Moreover, 35.5% of those aged 65 and older and 57.6% of those aged 80 and older have one or more severe disabilities.[5] Chronic conditions that may result in the need for long-term and chronic care include heart disease, cancer, stroke, chronic obstructive pulmonary disease, fractures, arthritis, diabetes mellitus, hyperplasia of prostate, kidney disease, and hypertension.[6,7]

Older adults with chronic conditions, particularly those with ailments that affect functioning, require comprehensive support and continuity of services. Unfortunately, provision of health care to chronic care patients typically is fragmented across different settings, each offering specific types and levels of care, and each with its own rules regarding administration, financing, and reimbursement. Described by the Institute of Medicine as a "nightmare to navigate," these siloed health and social services make it difficult for those with chronic conditions to gain access to the care they need.[8]

Although U.S. health care seems to be gradually evolving toward greater use of home- and community-based services (HCBS) to reduce institutionalization and use of medical services, some policy researchers have expressed reservations about the cost-effectiveness of HCBS programs.[9–11] Nevertheless, recent studies[12,13] have found that timely HCBS interventions can improve health-related quality of life, cut hospitalization admissions and length of stay, decrease emergency department (ED) visits, and reduce mortality. This is particularly true for the 5% to 10% of high-risk older persons who incur an inordinately high share of costs.[14,15]

THE CARE ADVOCATE PROGRAM

The Care Advocate (CA) Program, described more fully below, was developed to identify need for and improve access to HCBS for a high-risk population. The program coordinated Medicare managed care services with HCBS through an information and referral telephone-based care management intervention. CAs (Masters-level social workers) used assessment information and consumer preferences to refer those randomly assigned to the intervention to one or more of six categories of HCBS (in-home care, nutrition, home safety, transportation, adaptive equipment, and supportive services) and, if appropriate, to medical group case management and health plan care managers. In doing so, they conferred decision-making responsibilities on those individuals most affected by the intervention.[16] Participants were contacted monthly by phone during the 12-month intervention to provide support, assess status, address questions, and make additional referrals as needed.

The primary research goal of the CA Program was to evaluate the effect of the intervention on use of insured medical services. Objectives included tracking how many and which HCBS services were offered, accepted, and used. In addition, the effect of the program on member satisfaction and retention was tested.
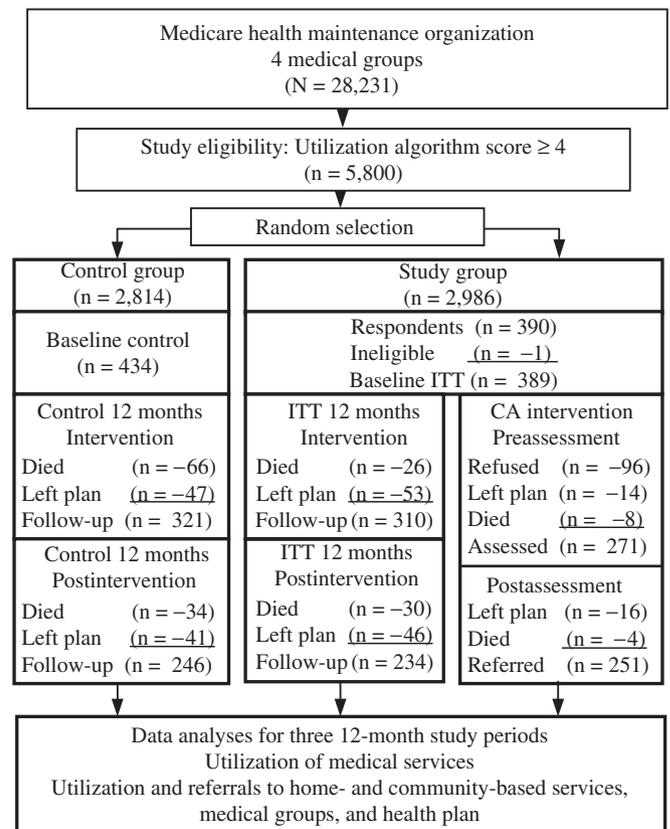
METHODS

The CA Program was a randomized, controlled trial. The study was conducted in collaboration with PacifiCare Health Services/Secure Horizons, two social service agencies, and four participating medical groups in Southern California and a team of researchers from the University of Southern California. Three Masters-level CAs worked from offices provided by the community-based social service agencies. The institutional review boards of PacifiCare Health Services Health Services/Secure Horizons, the social service providers, and the University of Southern California approved the protocols and instruments.

Study Sample

Figure 1 presents the flow through the three 12-month periods of the evaluation of those randomized into the control group and the intent-to-treat (ITT) group, as well as a treatment analysis of those in the ITT group who participated in the CA intervention. Eligibility criteria to participate in the study included aged 66 and older, enrolled for a minimum of 1 year in the Medicare-risk health plan, and met risk criteria using a healthcare utilization algorithm. PacifiCare clinical staff developed the algorithm, described in greater detail elsewhere,[17] based on literature review and preliminary data analyses, which indicated significant, positive associations with future healthcare service utilization, older age ($\geq$85), and past healthcare service utilization (number of hospitalizations, number of medications, and number of ED visits). Nursing home residents and those enrolled in similar studies were excluded.

Because of concerns about burdening controls and raising expectations for those who would continue to receive usual care, the eligible population (n = 5,800) was randomized to study (n = 2,976) and control (n = 2,824) groups before assessment. An a priori statistical power analysis was conducted to determine an adequate sample size to permit

Figure 1. Flowchart of intent-to-treat (ITT), care advocate (CA) intervention, and control group members through three 12-month study periods.

subanalyses of each medical group. Based on methods previously established,[18] it was determined that, using a significance criterion of .05, a sample size of 786 would be necessary for a statistical power of 0.80 using nondirectional (two-tailed) tests. Potential intervention participants were then randomly drawn from those randomized into the study group and invited to participate via a mailed letter asking permission to contact them by telephone. Recruitment was ongoing until an adequate sample was obtained. As intervention subjects entered the study, controls were randomly selected from those in the usual care group. After preliminary data analysis, one spouse who did not qualify for the study using the algorithm eligibility requirements was dropped from the analysis, although the individual continued with the intervention. During the 12-month intervention period, 66 control members died, and 47 left the plan. Over the same 12-month period, 26 ITT members died, and 53 left the plan. Of the 389 ITT members eligible for the study, 118 did not complete the intervention (8 died, 14 left the plan, and 96 refused to continue after initial contact but before assessment). CAs assessed 271 (69.7%) ITT members, although after assessment, but before any referrals were made, four members died and 16 left the health plan. Thus, although 271 members were assessed, 251 (64.5%) of the ITT group (n = 389) received the referral intervention.

CA Intervention

The CA intervention began with a comprehensive 83-question psychosocial/functional telephone assessment to deter-

mine short-term, immediate care needs, and recommend supportive services that could address these needs. The assessment included sociodemographic characteristics (age, sex, marital status, education, living arrangement, income, primary language), current medical conditions, service utilization over the previous year, and current pharmacy use. The intervention employed a brief cognitive screen (name, date, birth date, age).[19] It used the Katz index of independence in activities of daily living to assess performance in bathing, dressing, toileting, transferring, and continence[20] and Lawton's instrumental activities of daily living to measure need for assistance with cooking, cleaning, shopping, money management, transportation, use of telephone, and medication administration.[21] Consumer preferences, a key element, were incorporated into service recommendations. Based on the assessment, CAs offered information about HCBS that considered each member's needs and preferences.

After assessment, members received a letter detailing the resources discussed and providing information about follow-up procedures if a link to the service had already been made. In addition, to monitor referrals and provide additional information as needed, CAs made a follow-up call within 1 week of the assessment and thereafter every month for 12 months. When necessary, CAs helped interested members access referred services.

Those not able to respond by phone at the initial assessment received a one-time home visit. Criteria for a home visit were that the client was unable to provide information to a CA or was unable to use or access a referral because of physical, cognitive, or emotional disabilities. Twenty-two percent of those contacted (n = 60) met these criteria and received an in-home assessment.

To facilitate referrals, CAs developed relationships with a variety of community providers as well as medical case management nursing staff within the four medical groups. Participants were encouraged to contact CAs at any time with questions, concerns, crises, or if further consultation was needed. Upon completion of the 12-month intervention phase, members received additional referrals to ensure appropriate, ethical termination from the program.[22]

Data Collection

Dependent utilization variables included primary care physician (PCP) and specialist physician services, hospital admissions, hospital days, and ED use. Utilization was measured three times: at baseline using the time frame of 12 months before enrollment in the intervention, during the 12-month intervention, and 12 months postintervention. PacifiCare Health Services data analysts provided dates of entry to and termination from the plan. In addition, PacifiCare Health Services and the four medical groups provided administrative utilization data. Intervention data (referrals and utilization of HCBS) were obtained from electronic CA records. Staff at PacifiCare Health Services linked these data and encrypted the files, removing identifiers, before providing them to the University of Southern California research team.

Data Analysis

Randomization to study and control groups was performed using the random number generation feature of Excel 2000

(Microsoft Corp., Redmond, WA). The SAS System for Windows (8.02, SAS Institute, Inc, Cary, NC)) was used to convert claims-level utilization data to person-level; ascertain individual member start dates; determine pre-, during, and postintervention study periods for each study member; and randomize study subjects. Once claims-level data were converted to person-level data, they were analyzed using the SPSS (Version 10.01, SPSS, Inc., Chicago, IL) statistical program to generate descriptive statistics and perform all other statistical analyses.

Use of insured medical services (PCP visits, specialist visits, hospital days, hospital admissions, and ED visits) was measured as individual change from 12 months preintervention to 12 months during or 12 months postintervention. Change score frequencies were examined, and categories of change (decreased = 1, increased = 2, no change = 3) were determined using plus or minus one standard deviation as cutoff points.[23] Chi-square tests were used to determine significant differences between discrete variables by ITT or control group in each of the three 12-month periods. Binary correlations, significant relationships, and two-tailed t tests were used to determine significant differences for continuous variables where the distribution was normal. When the distributions were skewed, as is frequently the case with count data (PCP visits, specialist visits, hospital admissions, hospital days, and ED visits), Mann–Whitney U nonparametric tests were used to test the null hypothesis that two independent samples were from the same population.[24] Finally, multinomial logistic regression models compared change in utilization patterns by ITT versus control and by CA intervention versus control.

ITT Analysis

This study used ITT and treatment group analyses. It is common, in clinical trials, for participants to refuse treatment or to drop out of the study for various reasons: moved out of the area or changed health plans, for example. ITT analysis takes the view that all treatment group members should be analyzed regardless of whether they received the treatment. This analysis assumed that, where possible, subjects in the ITT group remained "on treatment" throughout the observation period.[25,26]

CA Treatment Analysis

It was anticipated that, if there was an intervention effect, it would be stronger when comparing those who participated in the intervention with controls rather than ITT group with controls, so a treatment group analysis was performed. Utilization data from those who participated in the CA intervention were compared with utilization data from controls during (CA intervention n = 271; control n = 434) and postintervention (CA intervention n = 212; control n = 320).

RESULTS

Baseline Characteristics

Testing the effectiveness of randomization, 17 characteristics of ITT, CA intervention, and control groups in three categories (demographics, health status, and medical service utilization) were compared at baseline (12 months

preintervention). There were no statistically significant differences in age, sex, or measures of health status (not shown). Using Mann–Whitney U nonparametric tests for count data (PCP visits, specialist visits, hospital admissions, hospital days, and ED visits), only the number of PCP visits for the ITT group was significant ($Z = 1.967$, $P < .05$) when compared with controls, although given the high utilization of PCP services by both groups (97.2% ITT vs 91.7% control) and the lack of significance when using t tests (for PCP visits the distribution curve was normal), this difference was not considered substantive.

Utilization of HCBS

Overall, 251 individuals who continued after the assessment accepted at least one referral. Of these, 164 (65.3%) used at least one service referral, and 87 (34.7%) took the information for future reference. Table 1 depicts the utilization patterns of referred healthcare services (HCBS, medical groups, and health plan). Using referral-level analysis, during the 12-month intervention, CAs made 3,331 referrals, 2,584 of which were accepted (77.6%). Of those, 823 (31.8%) were used. Acceptance of a referral meant a member or representative took the information, whether for immediate or future use. Use of a referral meant that a member or representative contacted the service at least once.

Supportive services (908) were the most frequently referred HCBS. The second highest referral was not a HCBS category; rather, it was to member medical case management services (629). Although acceptance rates were high for all referred services, once accepted, utilization rates for HCBS (for example, the utilization rate for supportive services was only 27.8%) were not as high as utilization rates for referrals to health plan (74.5%) and medical services (46.1%). Indeed, in-home care had an acceptance rate of 81.3% but was used only 12.9% of the time by members. At a postintervention focus group discussion conducted by the authors, CAs suggested that rates of utilization of HCBS appeared to be inversely related to the out-of-pocket costs associated with each type of referral.

Utilization of Medical Services
ITT Analysis

Compared with baseline measures, during the 12-month intervention, ITT members were 82% more likely to in-crease their utilization of PCP care ($P < .01$) and 74% more likely to increase their utilization of specialist physicians ($P < .05$) than control group members. Moreover, hospital admissions ($P < .05$) were significantly more stable for ITT group members than for controls. There were no significant differences in patterns of change for hospital days or ED visits between ITT members and controls. Compared with baseline measures, at 12 months postintervention, there were no significant differences between ITT members and controls in the likelihood of utilization change in any of the measured medical services.

CA Treatment Analysis

Analysis of the CA intervention group medical services utilization patterns revealed a stronger intervention effect, with less utilization of costly medical services during the intervention period than the control group used. As Table 2 shows, during the intervention period, those who received the CA services were twice as likely as controls to visit their PCP but 57% less likely than controls to have increased hospital admissions and 61% less likely to have increased hospital days than controls. Consistent with the ITT analysis described above, over the 12-month postintervention period, there were no significant differences in medical service utilization between those who participated in the CA intervention and controls.

DISCUSSION

The present study examined a simple model of telephone care management that employed Masters-level CAs to bridge insured Medicare managed care with HCBS using assessment, referral to mutually agreed upon services, and monthly follow-ups. The goal of the study was to test the extent to which the CA intervention affected consumers' use of insured medical services. Increased access to and use of uninsured HCBS were expected to reduce use of insured high-cost medical services by ITT members.

One concern expressed by team members from the health plan was that the intervention would increase physician visits of those receiving the intervention. Referrals back to medical plans and to HCBS during the monthly monitoring process increased PCP visits, but these visits also may have facilitated observed changes in costly hospital admissions and hospital days for the ITT and CA intervention groups during the intervention period.

Implications

Future research should focus more explicitly on how, in a consumer choice model, periodic assessments, monthly contacts, and improved access to medical services and HCBS affect the wellness and health outcomes of targeted high-risk older persons over sustained periods. More work is required to identify and effectively recruit those who could benefit from improved access to HCBS, because the current technology for targeting services is inexact.[27–30] Measures of previous high-service utilizations and frailty are not necessarily measures of a participant's readiness to use referrals to HCBS services. PCPs were made aware of their patients' participation but were not involved in referring patients to the intervention. The role of the PCP in determining the need and readiness of individuals to accept

Table 1. Acceptance and Utilization Patterns of Referred Healthcare Services

Referral Category	Referrals n	Accepted n (%)	Used n (%)
Supportive services	908	737 (81.2)	205 (27.8)
Medical services	629	564 (89.7)	260 (46.1)
In-home care	497	404 (81.3)	52 (12.9)
Transportation	454	356 (78.4)	81 (22.8)
Health plan services	212	165 (77.8)	123 (74.5)
Home safety	261	147 (56.3)	28 (19.0)
Adaptive equipment	127	112 (66.2)	47 (42.0)
Nutrition	243	101 (41.9)	27 (26.7)
Total	3,331	2,584 (77.6)	823 (31.8)

Table 2. Changes in Utilization Patterns Related to Costly Medical Services: Baseline to End of Intervention

	Decreased Use	Increased Use
Medical Healthcare Service	Odds Ratio (95% Confidence Interval) P-value	
Primary care physician	0.89 (0.55–1.44)	2.05 (1.28–3.28) <.001
Specialist	0.77 (0.49–1.22)	1.67 (0.96–2.92)
Hospital admissions	0.74 (0.43–1.28)	0.43 (0.22–0.84) <.01
Hospital days	0.81 (0.43–1.51)	0.39 (0.17–0.86) <.05
Emergency department	0.57 (0.31–1.05)	0.78 (0.42–1.43)

HCBS could have enhanced the intervention. During the postintervention focus group session, CAs suggested that better clinical information from the medical groups and reasonable involvement of PCPs would aid in identifying those most in need of services and encourage member participation in the program.

Limitations

Important limitations must be considered when applying the findings. Although a randomized, controlled study is the gold standard for reducing selection bias in comparative studies, in the present study, only those in the ITT group were recruited to participate, potentially introducing selection bias. However, initial comparisons of the intervention and control groups indicated that randomization was valid, i.e., the samples were not significantly different on 16 of 17 measured variables, and researchers did not consider the difference, PCP visits, to be substantive. Moreover, statistical comparisons using t tests, chi-square tests, and Mann–Whitney U tests for nonparametric data indicated that treatment and control samples were not significantly different from the eligible population. Finally, although the use of four medical groups increased the generalizability of the CA Program, this demonstration reflected the experiences of members from one managed care plan, in one area of the country. The positive findings from the CA Program suggest that future studies should evaluate this type of intervention at additional sites.

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