

## Special Article

## A CONTROLLED TRIAL OF INPATIENT AND OUTPATIENT GERIATRIC EVALUATION AND MANAGEMENT

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**ABSTRACT**

**Background** Over the past 20 years, both inpatient units and outpatient clinics have developed programs for geriatric evaluation and management. However, the effects of these interventions on survival and functional status remain uncertain.

**Methods** We conducted a randomized trial involving frail patients 65 years of age or older who were hospitalized at 11 Veterans Affairs medical centers. After their condition had been stabilized, patients were randomly assigned, according to a two-by-two factorial design, to receive either care in an inpatient geriatric unit or usual inpatient care, followed by either care at an outpatient geriatric clinic or usual outpatient care. The interventions involved teams that provided geriatric assessment and management according to Veterans Affairs standards and published guidelines. The primary outcomes were survival and health-related quality of life, measured with the use of the Medical Outcomes Study 36-Item Short-Form General Health Survey (SF-36), one year after randomization. Secondary outcomes were the ability to perform activities of daily living, physical performance, utilization of health services, and costs.

**Results** A total of 1388 patients were enrolled and followed. Neither the inpatient nor the outpatient intervention had a significant effect on mortality (21 percent at one year overall), nor were there any synergistic effects between the two interventions. At discharge, patients assigned to the inpatient geriatric units had significantly greater improvements in the scores for four of the eight SF-36 subscales, activities of daily living, and physical performance than did those assigned to usual inpatient care. At one year, patients assigned to the outpatient geriatric clinics had better scores on the SF-36 mental health subscale, even after adjustment for the score at discharge, than those assigned to usual outpatient care. Total costs at one year were similar for the intervention and usual-care groups.

**Conclusions** In this controlled trial, care provided in inpatient geriatric units and outpatient geriatric clinics had no significant effects on survival. There were significant reductions in functional decline with inpatient geriatric evaluation and management and improvements in mental health with outpatient geriatric evaluation and management, with no increase in costs. (N Engl J Med 2002;346:905-12.)

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**A** MULTIDISCIPLINARY, comprehensive approach to geriatric assessment has evolved over the past 20 years as a way to improve the care of frail elderly patients with complex conditions.<sup>1-6</sup> In early, single-site investigations, comprehensive geriatric assessment in special inpatient units dramatically improved survival and functional status.<sup>7,8</sup> In subsequent evaluations, such units have been less successful in improving these outcomes.<sup>4,9-12</sup> The effects of outpatient clinics for geriatric evaluation and management have been small, although some studies have shown improvements in patients' perceptions of their health, ability to perform instrumental activities of daily living, general well-being, depression scores, and extent of social activity.<sup>13-17</sup> One study showed that such clinics help maintain functioning and the ability to perform daily activities.<sup>18</sup>

A 1989 consensus conference recommended that a multicenter trial be conducted to determine the benefit of geriatric evaluation and management programs.<sup>19</sup> We performed a study to assess the effects of inpatient units and outpatient clinics for geriatric evaluation and management.

**METHODS**

The study was conducted under the auspices of the Veterans Affairs Cooperative Studies Program. The protocol was approved by the institutional review board at each participating institution and by the Human Rights Committee of the Cooperative Studies Program Coordinating Center in Palo Alto, California. All patients gave written informed consent before enrollment.

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The 11 centers that participated in the study were chosen from Veterans Affairs medical centers with established inpatient and outpatient programs of geriatric evaluation and management. The study chairmen reviewed and visited the centers to verify their conformity to the Veterans Affairs criteria for these programs<sup>20</sup>; an expert in the evaluation of team process also visited each center to assess the effectiveness of the program teams.<sup>21</sup> Patients were enrolled between August 1, 1995, and January 31, 1999.

### Patients

A trained research assistant at each center identified patients who met the following criteria for eligibility: an age of at least 65 years, hospitalization on a medical or surgical ward, an expected length of stay of at least two days, and a frail condition. Patients who met two or more of the following criteria were considered to be frail: inability to perform one or more basic activities of daily living, a stroke within the previous three months, a history of falls, difficulty walking, malnutrition, dementia, depression, one or more unplanned admissions in the previous three months, prolonged bed rest, or incontinence. Patients were excluded if they were admitted from a nursing home, were already receiving care at an outpatient clinic for geriatric evaluation and management, had previously been hospitalized in an inpatient unit for geriatric evaluation and management, were currently enrolled in another clinical trial, had a severe disabling disease or terminal condition or severe dementia, did not speak English, lacked access to a telephone (for follow-up), or were unwilling or unable to return for follow-up clinic visits. These criteria were designed to select patients most likely to benefit from a program of geriatric evaluation and management.<sup>22-24</sup> The Charlson comorbidity index was calculated.<sup>25</sup> Inpatients were considered for enrollment when the team on the geriatric evaluation and management unit decided that their condition was stable.

Enrolled patients were randomly assigned to receive inpatient care in a geriatric evaluation and management unit or usual inpatient care, followed by outpatient care in a geriatric evaluation and management clinic or usual outpatient care, also randomly assigned. The clinicians who provided geriatric evaluation and management or usual care knew the patients were enrolled in the study. Randomization was performed with the use of a computer program at the coordinating center. The randomization codes were generated according to a two-by-two factorial design, with stratification according to the center and the patient's functional status (high or low), with the use of permuted blocks of eight patients for the four treatment groups. Inpatient assignments were provided immediately. Outpatient assignments were revealed within 24 hours before discharge.

### Interventions

The inpatient and outpatient intervention teams, each consisting of a geriatrician, a social worker, and a nurse, followed their standard protocols for geriatric evaluation and management, with specific instructions to complete the history taking and physical examination, including screening for geriatric syndromes such as incontinence or falls (within three days for patients assigned to the geriatric evaluation and management unit); develop a list of problems; assess the patient's functional, cognitive, affective, and nutritional status; evaluate the caregiver's capabilities; and assess the patient's social situation. A plan of care was developed, and the team on the geriatric evaluation and management unit met at least twice a week to discuss the plan. Preventive and management services (e.g., dietetics, physical and occupational therapy, and clinical pharmacy) were coordinated to address the problems identified, with a general emphasis on maintaining the patient's functional status. Inpatients who were assigned to receive usual care received all appropriate hospital services except for those provided by the team on the geriatric evaluation and management unit. Outpatients assigned to receive usual care were provided with at least one follow-up appointment

in an appropriate clinic. After the initial site visits, the process of care was evaluated with the use of annual questionnaires,<sup>21</sup> as well as a specific checklist for each part of the intervention, in order to ensure compliance with the study protocol.

### Outcomes

Follow-up data were obtained immediately after discharge and 6 and 12 months after randomization. The primary outcomes were survival and health-related quality of life, as assessed on the basis of the Medical Outcomes Study 36-Item Short-Form General Health Survey (SF-36),<sup>26,27</sup> one year after randomization. Changes in SF-36 scores that differ between groups by 2 or more points on a scale of 0 to 100 have been shown to be clinically or socially meaningful.<sup>28</sup>

Secondary outcomes included functional status, assessed on the basis of the ability to perform basic and instrumental activities of daily living,<sup>29,30</sup> as determined by an interviewer, and physical performance, as measured with the use of the Physical Performance Test.<sup>31</sup> Differences between groups of 0.5 or more in scores for the six-item Katz activities-of-daily-living scale and 3.5 or more in scores for the seven-item Physical Performance Test are strongly predictive of death and of placement in a nursing home.<sup>32</sup> Utilization and costs of health care services were determined with the use of the computer program at each center, centralized Veterans Affairs data bases,<sup>33</sup> and patients' or caregivers' reports of non-Veterans Affairs nursing home care.

All data obtained during hospitalization were recorded by research assistants on predesignated forms. All outcome data (except for the score on the Physical Performance Test, which was administered by on-site research assistants) were obtained through telephone interviews conducted by a research assistant at the coordinating center, who used a standardized protocol and was unaware of the treatment assignments. Data collected at the participating centers were faxed directly to the coordinating center, and the DataFax program was used to enter and manage the data.

### Statistical Analysis

We calculated that a sample of 1400 patients would be required for the study to have 80 percent power to detect differences in outcome measures as small as 7 units (e.g., a difference in mortality of 7 percentage points), with a two-sided significance level of 0.05. The precision of the results can be inferred from the reported 95 percent confidence intervals for treatment effects.

The analytic strategy involved testing for an interaction between inpatient and outpatient geriatric evaluation and management. If no interaction was found, then the main effects of each type of intervention would be determined. Kaplan-Meier curves, log-rank tests, and Cox regression were used for the analysis of mortality. In addition to the main effects of inpatient and outpatient geriatric evaluation and management, the Cox model included base-line data on age and ability to perform activities of daily living, which were used to stratify the study groups at randomization so that the analysis would follow the study design.

A two-sample t-test was used to analyze changes from base line in the SF-36 summary scores and the ability to perform basic and instrumental activities of daily living at discharge and at 12 months, with adjustment for the length of the hospital stay. To address possible imbalances between the groups at discharge, we performed a secondary analysis of outpatient geriatric evaluation and management in which we examined changes between discharge and follow-up at 12 months. Similar analyses were performed with scores on the Physical Performance Test and the total number of hospital admissions. Since the data on total costs, total days in the hospital, and total days in long-term care were highly skewed, we performed a logarithmic transformation on the data before making comparisons with the use of a t-test. Because of multiple comparisons, a P value  $\leq 0.01$  was considered to indicate statistical significance. For utilization and cost data, which did not involve multiple comparisons,

a P value  $\leq 0.05$  was considered to indicate statistical significance. All reported P values are two-sided. No interim statistical analyses were performed.

RESULTS

A total of 1388 patients were enrolled in the study. For the first 11 months of the study (August 1995 through June 1996), we collected demographic information on all patients who were screened. During this period, 11,796 patients were screened, and 409 of these patients were enrolled (3 percent). Reasons for ineligibility included prior treatment in a geriatric evaluation and management program or residence in a nursing home (22 percent of the patients); severe or terminal illness (23 percent); a condition that was not considered frail (30 percent); discharge, persistently unstable condition, or death before enrollment (18 percent); or lack of a telephone, refusal to give informed consent, or unwillingness to return for clinic appointments (4 percent). Information on vital status at one year was obtained for all patients except for one who dropped out of the study during the index hospitalization. Ninety-nine percent of all planned follow-up interviews were conducted successfully by telephone.

Most of the patients were men, and most were white; the mean age was 74.2 years (Table 1). Over half the patients were married, most were retired, and the majority had less than a high-school education. Seventy percent had been admitted to a medical ward. The average Charlson comorbidity index was 2.6, and the patients had substantial difficulties in all measures of the SF-36, physical performance, and both basic and instrumental activities of daily living. There were no significant differences among the four treatment groups.

Figure 1 shows Kaplan–Meier survival curves over the course of the study. Neither the univariate analysis (the log-rank test) nor the multivariate analysis (Cox regression) showed significant differences in survival among the four groups, nor were there significant differences in analyses of interaction effects and of the main effects of inpatient and outpatient geriatric evaluation and management (Table 2). Subgroup analyses showed no significant differences between the main effects of inpatient geriatric evaluation and management and those of outpatient geriatric evaluation and management according to functional status (low [assistance required with  $\geq 3$  activities of daily living] vs. high [assistance required with  $< 3$  activities of daily living]), age ( $> 75$  vs.  $\leq 75$  years), the comorbidity index (low [score on the Charlson comorbidity index,  $\leq 2$ ] vs. high [score,  $> 2$ ]), or the year of enrollment. Mortality was similar among the centers, with all 95 percent confidence intervals for the relative risk of death overlapping 1.0.

TABLE 1. BASE-LINE CHARACTERISTICS OF THE 1388 PATIENTS.\*

CHARACTERISTIC	VALUE
Sex — no. (%)	
Male	1355 (98)
Female	33 (2)
Race or ethnic group — no. (%)	
White, not Hispanic	1004 (72)
Black, not Hispanic	346 (25)
Other	38 (3)
Age	
65–73 yr — no. (%)	663 (48)
$\geq 74$ yr — no. (%)	725 (52)
Mean — yr	74.2
Marital status — no. (%)	
Married	756 (54)
Widowed	285 (21)
Single, divorced, or separated	347 (25)
Education — no. (%)	
$\leq 11$ yr	763 (55)
12 yr	346 (25)
$> 12$ yr	279 (20)
Employment status — no. (%)	
Retired	1123 (81)
Unable to work due to disability	201 (14)
Other	64 (5)
Type of ward — no. (%)	
Medical	967 (70)
Surgical	421 (30)
Respondent — no. (%)	
Patient	1173 (85)
Caregiver	215 (15)
Comorbidity index†	2.6 $\pm$ 1.9
SF-36 score‡	
Physical functioning	24.6 $\pm$ 25.1
Physical limitations	14.4 $\pm$ 28.7
Emotional limitations	60.9 $\pm$ 44.2
Bodily pain	41.2 $\pm$ 30.5
Energy	34.8 $\pm$ 24.2
Mental health	63.9 $\pm$ 24.1
Social activity	49.2 $\pm$ 32.7
General health	46.7 $\pm$ 22.2
Change in health in previous year	34.4 $\pm$ 27.4
ADL score§	
Instrumental	5.5 $\pm$ 2.9
Basic	3.0 $\pm$ 2.0
Score on Physical Performance Test¶	9.4 $\pm$ 3.7

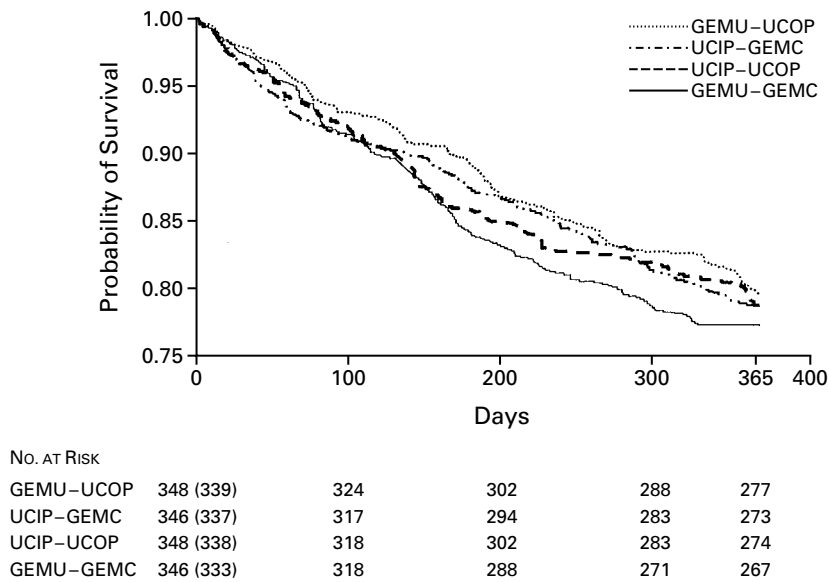
\*None of the variables differed significantly among the four treatment groups. Plus–minus values are means  $\pm$  SD.

†The comorbidity index indicates the number and severity of coexisting conditions, on a scale from 0 to 34, with higher numbers indicating greater comorbidity.

‡Scores on the Medical Outcomes Study 36-Item Short-Form General Health Survey (SF-36) were adjusted so that for each item, higher scores indicate better functioning. The scores were then transformed according to the following formula so that each scale ranged from 0 to 100:  $([\text{raw score} - \text{lowest possible score}] \times 100) \div \text{raw-score range}$ .

§The scale for basic activities of daily living (ADL) included six items, with a score of 1 for independent functioning on each and a maximal score of 6. The scale for instrumental ADL included nine items, with a score of 1 for independent functioning on each and a maximal score of 9.

¶Physical performance was scored on a scale of 1 to 4 for each of seven items, with higher scores indicating better performance and a maximal score of 28.



**Figure 1.** Kaplan-Meier Analysis of Survival According to Treatment Group.

The numbers of patients at risk are shown below the graph, with the numbers at discharge in parentheses. GEMU denotes geriatric evaluation and management unit; UCOP usual care, outpatient; UCIP usual care, inpatient; and GEMC geriatric evaluation and management clinic.

**TABLE 2.** SURVIVAL AT ONE YEAR.\*

VARIABLE	NO. OF PATIENTS	DEATHS	PROBABILITY OF SURVIVAL†	RELATIVE RISK OF DEATH (95% CI)
		no. (%)	%	
Total	1388	297 (21)		
Treatment group				
UCIP-UCOP‡	348	74 (21)	78.7±2.2	
GEMU-UCOP	348	71 (20)	79.6±2.2	0.95 (0.68-1.31)
UCIP-GEMC	346	73 (21)	78.9±2.2	1.00 (0.85-1.17)
GEMU-GEMC	346	79 (23)	77.2±2.3	1.03 (0.74-1.14)
Interaction effect				
Between UCIP-UCOP and GEMU-GEMC‡	694	153 (22)	78.0±1.6	
Between GEMU-UCOP and UCIP-GEMC	694	144 (21)	79.3±1.5	0.93 (0.74-1.17)
Main effect of GEMU§				
UCIP‡	694	147 (21)	78.8±1.6	
GEMU	694	150 (22)	78.4±1.6	1.02 (0.81-1.28)
Main effect of GEMC¶				
UCOP‡	696	145 (21)	79.2±1.5	
GEMC	692	152 (22)	78.0±1.6	1.07 (0.86-1.35)

\*CI denotes confidence interval; UCIP usual care, inpatient; UCOP usual care, outpatient; GEMU geriatric evaluation and management unit; and GEMC geriatric evaluation and management clinic.

†Plus-minus values are means ±SE. There were no significant differences in the probability of survival.

‡This was the reference group.

§The comparison was between GEMU and UCIP, regardless of the type of outpatient care.

¶The comparison was between GEMC and UCOP, regardless of the type of inpatient care.

In the analysis of health-related quality of life, assignment to the geriatric evaluation and management unit had positive effects on SF-36 scores for physical functioning, bodily pain, energy, and general health at discharge, even when the analysis was adjusted for the length of stay (Table 3). In addition, inpatient geriatric evaluation and management had positive effects on physical performance and basic activities of daily living at the time of discharge (Table 3). Only the effect on bodily pain was sustained at one year. Outpatient geriatric evaluation and management had significant positive effects on the scores for energy,

mental health, and general health at one year, as compared with base-line scores. However, when scores at one year were compared with those at discharge, only the improvement in the score for mental health remained significant (Table 3). Though the effects of inpatient and outpatient geriatric evaluation and management were independent and additive, there was no synergy between them at one year. The outcomes at six months were consistent with those at one year (data not shown). There were no significant interaction effects (defined by  $P \leq 0.01$ ) between the assigned treatment and the center.

**TABLE 3. HEALTH-RELATED QUALITY OF LIFE AND FUNCTIONAL STATUS.\***

VARIABLE	GEMU	UCIP	P VALUE†	GEMC	UCOP	P VALUE†
	mean change in score			mean change in score		
<b>SF-36</b>						
Physical functioning						
At discharge	-1.5	-5.4	0.006	-3.7	-3.2	0.75
At 12 mo	6.7	4.5	0.30	6.8 (9.7)	4.5 (7.2)	0.23 (0.17)
Physical limitations						
At discharge	4.5	4.7	0.92	5.9	3.2	0.20
At 12 mo	34.0	29.8	0.13	31.3 (24.1)	32.5 (29.2)	0.65 (0.06)
Emotional limitations						
At discharge	13.0	12.0	0.71	13.4	11.6	0.53
At 12 mo	22.0	20.3	0.58	22.1 (9.2)	20.2 (8.0)	0.52 (0.62)
Bodily pain						
At discharge	15.3	9.2	0.001	11.9	12.8	0.64
At 12 mo	24.9	20.0	0.01	21.9 (10.2)	22.9 (9.6)	0.66 (0.81)
Energy						
At discharge	0.8	-2.6	0.01	0.8	-2.5	0.02
At 12 mo	4.5	1.8	0.12	5.4 (3.6)	1.0 (3.2)	0.009 (0.78)
Mental health						
At discharge	-0.3	-1.5	0.33	-0.6	-1.2	0.60
At 12 mo	4.5	2.5	0.24	6.3 (5.7)	0.8 (1.5)	0.001 (0.004)
Social activity						
At discharge	2.7	1.0	0.43	2.4	1.2	0.57
At 12 mo	18.3	16.4	0.48	18.3 (16.0)	16.4 (13.8)	0.46 (0.36)
General health						
At discharge	-0.02	-3.4	0.006	-0.5	-2.9	0.04
At 12 mo	-5.5	-7.1	0.32	-4.4 (-5.5)	-8.2 (-7.1)	0.01 (0.32)
<b>Functional measures</b>						
Basic ADL						
At discharge	0.23	0.15	<0.001	0.20	0.20	0.58
At 12 mo	0.27	0.25	0.36	0.27 (0.05)	0.25 (0.03)	0.35 (0.51)
Instrumental ADL						
At discharge	-0.30	-0.30	0.80	-0.28	-0.30	0.40
At 12 mo	-0.20	-0.20	0.65	-0.18 (0.09)	-0.21 (0.08)	0.27 (0.62)
Physical performance						
At discharge	3.12	1.75	<0.001	2.34	2.60	0.24
At 12 mo	4.50	4.24	0.51	4.67 (2.13)	4.07 (1.30)	0.12 (0.03)

\*Values are mean changes in scores (adjusted for the length of stay) from randomization to either discharge or follow-up at 12 months; values in parentheses are mean changes in scores from discharge to follow-up at 12 months. A negative score represents a decrease in functioning or quality of life, and a positive score an improvement. For the Medical Outcomes Study 36-Item Short-Form General Health Survey (SF-36), changes in scores that differ by two or more points between groups are associated with clinical or socially relevant outcomes.<sup>28</sup> GEMU denotes geriatric evaluation and management unit; UCIP usual care, inpatient; GEMC geriatric evaluation and management clinic; UCOP usual care, outpatient; and ADL activities of daily living.

†P values are for between-group comparisons of mean changes in scores. P values in parentheses are for the comparison of the mean changes from discharge to 12 months.

The mean ( $\pm$ SE) total number of days in the hospital was greater for the group of patients assigned to the geriatric evaluation and management unit than for those assigned to usual inpatient care ( $35.3\pm 1.4$  vs.  $28.3\pm 1.4$  days,  $P<0.001$ ), primarily because of a longer initial hospitalization ( $23.2\pm 1$  vs.  $15.0\pm 0.9$  days,  $P<0.001$ ). In addition, the mean numbers of medical and surgical consultations were higher for patients assigned to the geriatric evaluation and management unit than for those assigned to usual inpatient care (medical consultations, 2.8 vs. 1.3; surgical consultations, 2.1 vs. 1.2;  $P<0.001$  for both comparisons). After the index hospitalization, the mean numbers of days in long-term care were slightly lower for the patients assigned to the geriatric evaluation and management unit than for those assigned to usual inpatient care ( $15.0\pm 1.8$  vs.  $17.1\pm 1.8$  days,  $P=0.03$ ), but the mean number of days in long-term care did not differ significantly between the group assigned to the geriatric evaluation and management clinic and the group assigned to usual outpatient care ( $15.4\pm 1.8$  vs.  $16.8\pm 1.8$  days). There were no significant differences in the number of clinic visits between the latter two groups.

The costs of the initial hospitalization were significantly higher for the patients assigned to the geriatric evaluation and management unit than for those assigned to usual inpatient care, but the costs of care after the initial hospitalization were lower — though not significantly so — for the first group (Table 4). Over the one-year period of the study, there was no significant difference in overall costs according to the type of inpatient care or according to the type of outpatient care.

## DISCUSSION

In this multicenter, randomized, controlled trial, there was no significant improvement in survival as a result of either assignment to an inpatient geriatric evaluation and management unit after stabilization of the acute illness or assignment to an outpatient ger-

iatric evaluation and management clinic after discharge, whether these interventions were used alone or together. The results of several clinically meaningful, post hoc subgroup analyses were similar. However, inpatient geriatric evaluation and management had a significant positive effect on health-related quality of life at the time of discharge — specifically, on scores for physical functioning and general health, bodily pain, basic activities of daily living, and physical performance. The magnitude of these changes has been shown to be associated with clinically or socially meaningful outcomes.<sup>28,32</sup> These findings suggest that inpatient geriatric evaluation and management are useful for improving functional status and management of pain while patients are in the hospital. Prevention of functional decline, a stated goal of the initial geriatric evaluation and management units,<sup>7</sup> was associated with some increase in cost during the initial admission. However, by the end of one year, there were no significant differences in costs between usual care and geriatric evaluation and management. Since only the improvement in pain was sustained at one year, regardless of the type of outpatient care, other approaches will be needed to maintain the benefits seen at the time of discharge. It is possible that our study design, in which the outpatient assignments were not revealed until discharge, prevented optimal coordination of care to maintain these gains.

Patients assigned to a geriatric evaluation and management clinic had significant improvements in three measures of well-being at one year, as compared with the base-line scores, but only one measure (mental health) was significantly improved at one year as compared with the score at discharge. Mental health, as well as self-reported general health, is an independent predictor of mortality, even after adjustment for other measures of health status,<sup>34</sup> and its improvement may be an appropriate and realistic goal for outpatient geriatric evaluation and management.<sup>35</sup>

These results are less dramatic than those of early, single-site studies,<sup>7,8</sup> especially with respect to the sus-

TABLE 4. MEAN ( $\pm$ SE) COSTS OF CARE.\*

CARE	GEMU		P VALUE	UCOP		P VALUE
	dollars			dollars		
Initial hospitalization	13,449 $\pm$ 621	10,758 $\pm$ 592	<0.001	12,254 $\pm$ 584	11,954 $\pm$ 663	0.72
Care after discharge	22,816 $\pm$ 1,080	26,533 $\pm$ 1,201	0.19	23,689 $\pm$ 1,091	25,654 $\pm$ 1,194	0.88
Total	36,265 $\pm$ 1,298	37,292 $\pm$ 1,369	0.29	35,943 $\pm$ 1,292	37,608 $\pm$ 1,374	0.69

\*Costs include all costs of inpatient, outpatient, and long-term care provided by Veterans Affairs medical centers, as well as care in private nursing homes. The costs of inpatient and outpatient care at non-Veterans Affairs facilities are not included.

tained effects of care in a geriatric evaluation and management unit on mortality; however, they are consistent with more recent findings.<sup>12,17,18,36</sup> One change since the early reports is the growth of geriatrics and the dissemination of principles of geriatric care within the medical system. Increasingly, Veterans Affairs medical centers are using a primary care approach, often with a team model.<sup>27</sup> Thus, it is possible that usual care has become progressively more like the programs of geriatric evaluation and management in earlier studies. The mortality rate associated with usual care in our study (approximately 20 percent) was substantially lower than that in the initial trial of geriatric evaluation and management (48 percent)<sup>7</sup> or in a subsequent trial (25 percent)<sup>8</sup> — a finding that supports the idea that the difference between these two types of care has diminished over time. At this point, there may be relatively little additional improvement in mortality that can be gained with the use of geriatric evaluation and management in a population of frail patients. A less likely explanation is that the units were ineffective, since they met the criteria generally accepted to characterize the best-functioning units, with team functions and processes of care that were equivalent to those of other highly effective programs.<sup>37,38</sup>

This study was limited in that it was conducted only within the Department of Veterans Affairs system and most of the patients were men. However, the initial study demonstrating the efficacy of geriatric assessment was also a Veterans Affairs study, as were several other single-site studies demonstrating only moderate effects.<sup>4</sup> Moreover, studies of inpatient and outpatient programs of geriatric evaluation and management in the private sector have shown similarly moderate effects.<sup>9,12,16,18</sup> Another limitation of our study was the inability to blind the clinicians providing care and the patients to the assigned treatments. However, all outcomes were assessed by an interviewer who was unaware of the treatment assignments.

Our eligibility criteria were based on those used in previous trials of geriatric evaluation and management, the criteria for admission to geriatric evaluation and management units at Veterans Affairs medical centers, published “targeting criteria,” and the recommendations of a panel of experts.<sup>22-24</sup> The patients we enrolled were quite similar to those in previous studies in terms of coexisting conditions, functional status, and demographic characteristics.<sup>24,39</sup> The uniformity of treatment effects in our patient population suggests that the results would probably have been similar if the patients had had more severe or less severe functional impairment and higher or lower scores on the Charlson comorbidity index.

The outcomes we analyzed were similar to those used in most previous studies. Improvement in functional status is considered important by both physi-

cians and patients.<sup>40,41</sup> Other outcomes, such as improvement in patients’ satisfaction with the care they receive (which may be indicated by the improvement in general health reported by patients assigned to outpatient geriatric evaluation and management), may be desirable.<sup>42</sup> It is possible that the measures we used to evaluate health-related quality of life lacked sufficient sensitivity. However, they have been used successfully as outcome measures in other trials of hospital care.<sup>27</sup> It is also possible that if the intervention had been initiated at the time of admission, the outcomes might have been better. Although this approach was effective in single-center trials,<sup>10,43</sup> it has not yet been replicated in multicenter trials.

Our findings are consistent with those of other rigorously controlled, multicenter trials that have not fully replicated the strikingly positive results of initial, single-center trials.<sup>44,45</sup> Several factors may account for the differences in results: changes in practice or circumstances during the interval between the initial trial and subsequent trials (almost always a period of several years), a smaller and more homogeneous sample in the initial trials, and the potential for a single-site bias in the initial trials.

The results of our multicenter trial suggest that inpatient or outpatient geriatric evaluation and management do not affect mortality. However, there were significant reductions in the degree of functional decline at discharge among patients assigned to inpatient units for geriatric evaluation and management and improvements in mental health among those assigned to outpatient clinics for geriatric evaluation and management, without an increase in overall cost. Thus, although inpatient and outpatient geriatric evaluation and management have some benefits, we must establish the most appropriate goals for such programs and determine how best to integrate them with other inpatient and outpatient services for frail elderly patients.

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