Consultative Geriatric Assessment for Ambulatory Patients

A Randomized Trial in a Health Maintenance Organization

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Previous studies have shown that comprehensive geriatric assessment and follow-up can improve the health of hospitalized elderly patients. To evaluate the effectiveness of consultative geriatric assessment and limited follow-up for ambulatory patients, we randomized 600 elderly patients who were enrolled in a health maintenance organization into three groups: (1) consultation by a geriatric assessment team, (2) consultation by a "second opinion" internist, and (3) only traditional health maintenance organization services (control patients). The geriatric assessment team identified previously unrecognized problems in 35% of patients and advised changes in medication regimens for more than 40%. Nevertheless, patients who received assessment achieved only a small benefit in cognitive function after 3 months, which was not sustained for 1 year. There was no difference among groups in other measures of health status. Consultative geriatric assessment with limited follow-up did not benefit most older ambulatory patients in a health maintenance organization; if such care can be used effectively for ambulatory patients, it will require either additional targeting or continuing care or both.

(*JAMA*. 1990;263:538-544)

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OVER the past decade, substantial interest has developed in comprehensive geriatric assessment in which an interdisciplinary team applies detailed, often standardized, assessments of a variety of domains to elderly patients. Anecdotal evidence suggests that the use of geriatric assessment is rapidly spreading. Our own data have shown that the majority of the country's medical schools now have specialized services or units designed to provide comprehensive geriatric assessment for various inpatient or outpatient populations and that half of these began operation during the last few years.[1]

Rapid proliferation of comprehensive assessment has raised important questions about its efficacy and cost. Thus far, there have been few randomized trials that address these issues. The recent National Institutes of Health Consensus Development Conference on Assessment concluded[2] that the effectiveness of assessment has been most convincingly demonstrated in the combined geriatric assessment and rehabilitation setting and in inpatient geriatric assessment units focused on elderly individuals with potentially reversible disabilities.[3-9] Results of studies conducted in other settings,[10-13] including the ambulatory sector,[14-17] have been inconsistent. Ironically, our survey data suggest that the majority of existing assessment services or units are currently directed at ambulatory patients.

With these considerations in mind, we conducted a randomized trial to evaluate the benefits of comprehensive geriatric assessment for elderly, ambulatory patients. In addition to mortality and health care use, we designed the study to focus on six measures including patients' satisfaction with care and their health status in terms of social activity, emotional health, cognitive function, physical function, and overall perceived health. Our hypothesis was that patients randomized to receive geriatric assessment would improve in terms of these outcomes relative to other groups. We chose a health maintenance organization (HMO) as our setting because of the increasing numbers of el-

derly patients being cared for by such organizations and the efforts by Medicare to accelerate this trend. We designed our intervention as a comprehensive evaluation with limited follow-up rather than as a case-management approach because we thought that constraints on the availability of specially trained health care providers and considerations of cost might make the former a more likely model for HMOs to employ. Previous investigation has suggested this might be an effective format.[17]

To determine whether any differential benefits achieved by consultative geriatric assessment were related to the unique features of the assessment rather than the provision of extra medical attention per se, we included three arms in our trial. Patients were randomized to receive a comprehensive geriatric assessment, to visit an internist for a second opinion consultation, or to receive the usual care at the HMO. We targeted enrollment of 600 patients (200 in each of the three intervention groups), a number larger than most previous investigations.

METHODS

Selection of Patients and Randomization

This investigation was performed at the Rhode Island Group Health Association (RIGHA), an 80 000-patient, staff model, HMO based in Providence, RI. All patients 70 years or older were rated by their primary physicians in terms of their current health (very poor, poor, fair, good, very good, or excellent) and their likelihood of deterioration (very likely, probably, possibly, or unlikely). Two groups of patients were invited to participate, those older than 74 years and those between 70 and 74 years who were rated as having fair or worse health or as experiencing very likely or probable deterioration.

Between March 1985 and February 1986, all study patients were recruited and stratified based on four factors: age (70 to 74 years vs 75 years or older), sex, the primary physician's rating of current health, and the identity of the patient's primary physician. Using this stratification, patients were then randomized with a computer-generated algorithm into the three groups described previously: (1) consultation by a geriatric assessment team with telephone follow-up, (2) consultation by a "second opinion" internist, or (3) the usual HMO services (control patients).

Interventions

Geriatric assessment and second opinion internist consultations were scheduled approximately 1 month after randomization. The geriatric assessment included an examination of approximately 2 hours total by a geriatrician, geriatric nurse practitioner, and a geriatric social worker. It was designed to incorporate a broad range of data regarding clinical and functional status and included all the basic elements specified in the National Institutes of Health Consensus Development Conference statement: physical health, mental health, social and economic status, functional status, and environmental characteristics.[2] All of the geriatricians were board-certified internists who had completed at least 1 year of clinical training in a geriatric fellowship program. They reviewed the patient's medical record and performed a comprehensive physical examination that focused on drugs, nutrition, new diagnoses, and the functional impact of the patient's medical illnesses. The nurse administered a standard protocol for clinical assessment, including an instrument that measured cognitive function and instruments patterned after the Katz et al[19] activities of daily living scale, and the instrumental activities of daily living scale from the OARS.[20] The social worker reviewed social support, social activities, coping style, psychological function, and economic and environmental issues. The team generally met for approximately 15 minutes after seeing the patient to generate a care plan and consult as a group with the patient and family.

In designing the experimental intervention, we were guided by the following two concerns: (1) that we maximize the number of individuals who represented different disciplines to ensure that positive outcomes could be generalized and were not dependent on one or two excellent providers, and (2) that we minimize the use of multiple different personnel to ensure coordinated care among the geriatric assessment teams. We decided to employ 10 different geriatricians but only three nurse–social worker teams to provide continuity and coordination.

Integration of this consultation with ongoing care was facilitated by direct communication in written form and, in some instances, also by telephone to regular providers. Consultants were instructed to convey in writing a summary of their findings, impressions, and suggestions, but the format for the communication was not otherwise defined. Depending on the nature and the acuity of the findings at the assessment, some kinds of follow-up (laboratory evaluations, diagnostic tests, and consultations with other specialists) were ordered immediately following telephone confirmation with the patient's regular physician or were suggested specifically in the consultation letter. Geriatric assessment personnel also initiated three follow-up telephone contacts with the patient or family during the first 2 months after the examination. These telephone contacts were intended to facilitate adjustment of care plans as well as maximize the likelihood of their adoption.

Second opinion consultations by internists were provided by 11 board-certified or board-eligible internists at RIGHA who had no special geriatric training or experience and who agreed to serve in this role. These examinations were not structured, but generally consisted of a 1-hour history and physical examination administered by the physician. As with the geriatric assessment, integration of this consultation was accomplished by written communication and in some instances by telephone contact with regular providers as well. Patients randomized to the control group received regular RIGHA services that included no extraordinary evaluations.

Content of the Geriatric Assessment and Second Opinion Internist Consultations

A board-certified internist who was blinded to the purposes of our investigation abstracted the consultation letters sent to the patients' primary physicians by the geriatric team and second opinion internists. Before abstraction, all patient and provider identifiers were removed. Using a structured protocol, information was obtained for each patient regarding the number of new diagnoses made, whether the patient received a psychosocial evaluation, and whether the consultant thought it was appropriate to obtain blood tests or other diagnostic tests, to modify the current medication regimen, to pursue additional mental health or medical consultations, or to arrange additional home and community services.

We took substantial effort to make the abstraction protocol extensive and precise to maximize reliability. When one of us (Dr Fretwell) reabstracted an 8% sample of consultation letters, we found that interrater agreement was greater than 90% for all categories noted previously, except for new diagnoses (83%).

Evaluation of Health Status

At the time of the baseline examination, the prevalence of 24 specific medical conditions relevant to elderly patients (eg, hearing impairment, congestive heart failure) was obtained

through review of office records. In addition to using indexes such as mortality, nursing home placement, and hospitalization, we employed a battery of interview instruments to measure changes in health status and satisfaction with health care—areas we thought likely to be especially sensitive in this patient group. Whenever possible, we employed instruments that had already been validated by other investigators. In some instances, minor word changes were made to suit the age group and the interview format. Instruments were pilot tested on more than 50 elderly patients who were not in the study and then revised to maximize reliability and to reduce skewness.

Patients were interviewed at the time of randomization and at follow-up examinations 3 months and 1 year subsequently. The interview took approximately 1 hour and contained questions regarding sociodemographic characteristics as well as the following measures: (1) overall perceived health—a six-item scale adapted from the RAND Health Insurance Study[21]; (2) cognitive function—Folstein and coworkers'[22] Mini-Mental State test; (3) functional status—four physical function scales of the Sickness Impact Profile[23] chosen to reflect both instrumental and personal care aspects of daily living (51 items all together); (4) emotional health—12 items adapted from the RAND Health Insurance Study[24]; (5) social activity—a 6-item scale adapted from Wan's study[25]; and (6) satisfaction—a 12-item instrument developed largely from the literature, particularly the scale of DiMatteo and Hays.[26]

All measures had internal consistency reliabilities in excess of 0.80, except for cognition (0.72) and social activity (0.46). A more complete description of psychometric characteristics is available elsewhere.[27] For consistency and ease in interpretation, scoring of items on the various scales was reversed where appropriate, so that higher values indicate better function. Because patient's scores on measures of functional health and emotional distress were not normally distributed, we transformed these before performing statistical tests. After inspecting univariate plots, we chose arcsine and logarithmic transformations, respectively.

Use of Medical Services and Costs of Care

From office records and claims data at RIGHA, we obtained information regarding office visits and use of diagnostic tests at RIGHA as well as the incidence, charges, and length of stay for acute-care hospitalizations. We used Medicare's prevailing rates in Rhode Island to estimate costs of diagnostic tests. Tabulation of office visits included all those to regular physicians, consultants, and nurse practitioners at RIGHA as well as the mandated consultation. Hospital costs were estimated by use of hospital- and year-specific cost-charge ratios.

Table 1.—Baseline Sociodemographic and Clinical Characteristics of the Study Sample

	Geriatric Assessment (n = 185)	Second Opinion Internist (n = 210)	Contr (n = 20
Demographic characteristics			
Mean ± SD age, y	76.7 ± 4.9	77.0 ± 4.7	76.9 ± 4
Sex, % women	51	48	50
Ethnic background, % white	94	93	94
Marital status, % married	65	65	60
Education, % with at least high school diploma	41	39	42
Income, % insufficient	6	9	8
Clinical characteristics			
Mean No. ± SD of medical problems	2.5 ± 1.6	2.5 ± 1.6	2.3 ± 1.7
Specific medical problems, %			
Stroke	5	7	6
Transient ischemic attack	4	4	2
Dementia	4	4	3
Parkinson's disease	1	1	1
Hip fracture	1	1	1
Arthritis	37	33	35
Hearing impairment	14	14	13
Vision disorder	12	11	12
Falling	0	1	1
Congestive heart failure	6	8	9
Myocardial infarction	11	11	8
Angina pectoris	14	19	16
Peripheral vascular disease	12	11	10
Valvular heart disease	2	3	4
Hypertension	52	46	51
Renal failure	2	1	0
Chronic obstructive pulmonary disease	12	15	12
Cancer	17	13	11
Diabetes mellitus	12	15	11
Urinary tract infection	2	2	3
Alcohol abuse	3	1	2
Anemia	4	7	5
Psychological disorder	14	11	12
Hypothyroidism	4	5	5

Data Analysis

The major objective of the analysis was to evaluate the health status and satisfaction of patients who were randomized into the three groups, both at 3 and 12 months after randomization. The principal outcomes included the six measures of satisfaction and health status noted previously. In designing the study, our primary hypothesis was that patients who were randomized to receive a geriatric assessment would improve in terms of these six outcomes relative to the other two groups. Figures 1 and 2 display data regarding the raw percentage change from baseline in the mean of each measure by patients in the different groups. Statistical significance of these changes was assessed using multiple linear regression models. In these models, the dependent variable was one of the six measures of satisfaction with care and health status noted previously. The following independent variables were included as covariates: the patient's baseline value of the outcome measures, patient's age and sex and whether the patient lived alone. Group assignment was coded via two dummy variables that provided for two contrasts, geriatric assessment vs the control group and geriatric assessment vs the second opinion internist.

Because we were especially interested in the effect of geriatric assessment on very old or debilitated patients and those whose social situations posed extraordinary risk, we replicated our

analyses that compared the change in health status for patients who received geriatric assessment vs the control group for subgroups defined by age (80 years and older vs younger than 80 years), functional health (the lowest quintile vs the remainder on the Sickness Impact Profile composite score), the combination of age and debilitation (75 years and older and rated in fair or worse health by their physician vs the remainder), cognitive function (the lowest quintile vs the remainder), and whether the patient lived alone. These subgroup analyses included the same covariates (age, sex, and living alone); however, we added physician-rated health in subgroups defined by different ages. This was done because among patients younger than 75 years we included only those in fair or worse health or who were thought likely to deteriorate. To assess statistical significance in these subgroup analyses, we adjusted our P value using the Bonferroni method for multiple tests and required a P value of .005 (.05 divided by 10). Finally, as an alternative and more powerful way of ascertaining whether geriatric assessment provided differential benefits to patients in different subgroups, we also included a set of appropriate interaction terms in regression models. Here we used the subgroups defined previously to form grouping variables.

Analysis of baseline characteristics was performed primarily with χ^2 tests and descriptive statistics, including means and SDs. Two-sided t tests and χ^2 analysis were used to analyze differences in the content of consultation (ie, suggestions to modify a medication regimen). Rates of nursing home placement and mortality were tested for equality with the χ^2 test. Differences in the rates of ambulatory visits and the costs of diagnostic tests were assessed with analyses of variance. To analyze use of hospital services, we first determined whether there were differences in rates of persons with one or more hospitalizations by group (χ^2 test). The analyses of variance were used to analyze length of stay and costs of hospital care, evaluating separately the study population as a whole and the subset who had one or more hospitalizations. A log transformation was used to normalize the length of stay and cost data.

Response Rate

Eleven hundred fifty-six patients were eligible for the study, according to our entry criteria. To achieve our target sample of 600, it was necessary to attempt contact with 894 of this cohort. Of these, 37 (4%) could never be reached

Table 2.—Baseline Health Status of the Study Sample*

	Mean ± SD		
	Geriatric Assessment (n = 181)	Second Opinion Internist (n = 208)	Control (n = 201)
Functional status (range, 0-100)	91 ± 11	91 ± 11	89 ± 13
Cognitive function (range, 0-30)	27.26 ± 2.23	26.92 ± 2.44	27.15 ± 2.37
Emotional well-being scale (range, 0-5)	3.66 ± 0.96	3.73 ± 1.03	3.55 ± 0.98
Social activity (range, 0-5)	2.61 ± 0.86	2.59 ± 0.84	2.63 ± 0.84
Overall perceived health (range, 0-5)	3.07 ± 1.42	3.08 ± 1.38	2.80 ± 1.39
Satisfaction (range, 0-5)	4.39 ± 0.78	4.39 ± 0.88	4.28 ± 0.89

*Ten patients who were judged to be incompetent by interviewers were excluded.

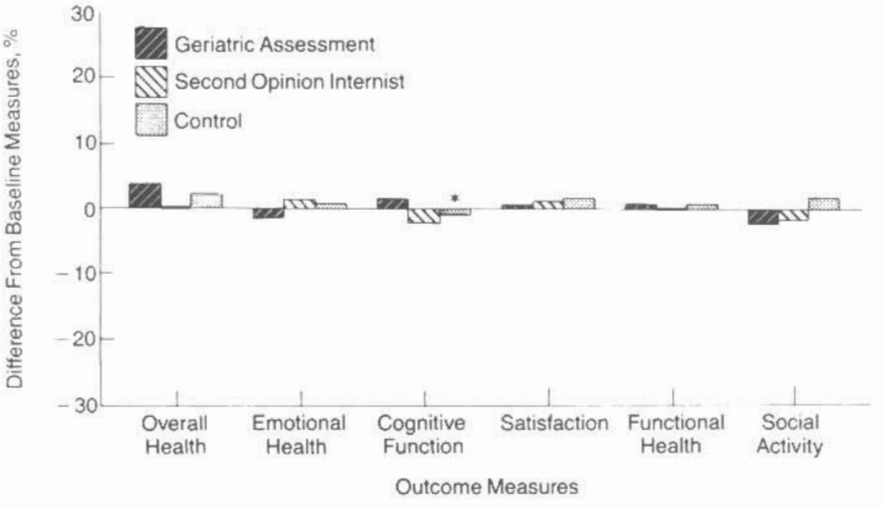

Fig 1.—Change in health status over 3 months. Asterisk indicates difference between geriatric assessment vs control ($P < .05$).

Fig 2.—Change in health status over 12 months.

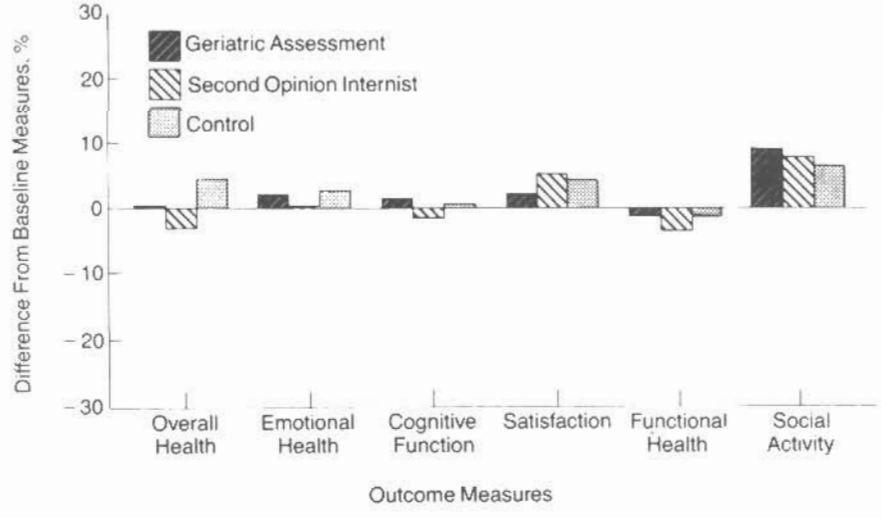

Table 3.—Differences in the Process of Care Provided by the Geriatric Assessment Teams and the Second Opinion Internist Consultant

Process Measure	Mean No. per Patient for Those Who Received Geriatric Assessments	Mean No. per Patient for Those Who Received Internist Consultations	95% Confidence Interval for the Difference in Means (Assessment—Internist Consultations)	% of Geriatric Assessment Patients Who Received ≥1	% of Internal Consultation Patients Who Received ≥1	95% Confidence Interval for the Difference in Percentages (Assessment—Internist Consultations)
New diagnosis	0.54	0.36	0.01-0.35	35	25	1-19
Blood tests	0.58	0.92	−0.66- −0.02	24	36	−21- −3
Other diagnostic tests	0.57	0.55	−0.18-0.22	33	36	−13-7
Medication change	0.74	0.44	0.12-0.48	46	30	6-26
Medical consultation	0.33	0.24	−0.02-0.20	26	23	6-12
Mental health consultation	0.05	0.03	−0.02-0.06	5	3	2-6
Psychosocial evaluation	0.75	0.54	0.11-0.31	75	54	11-31
Home services	0.06	0.02	−0.01-0.09	5	1	0-8
Community services	0.30	0.09	0.10-0.32	20	8	5-19

Table 4.—Indexes of Health Status and Use 1 Year After Randomization

Index	Geriatric Assessment (n = 185)	Second Opinion Internist (n = 210)	Control (n = 205)
Mortality, No. (%)	10 (5.4)	6 (2.9)	13 (6.3)
Nursing home placement, No. (%)	5 (2.7)	5 (2.4)	7 (3.4)
Mean No. (median, range) of office visits for all patients	10.8 (9, 0-27)*	9.7 (8, 0-39)*	8.7 (7, 0-41)*
Mean cost (median, range) of office diagnostic tests for all patients, $	236 (140, 0-1306)	269 (182, 0-2081)	297 (179, 0-2137)
Hospitalization rates†	46 (22)	54 (20)	54 (20)
Mean (median, range) length of stay for those hospitalized, d	7.8 (7, 1-20)	9.3 (7, 1-30)	10.2 (6, 1-46)
Mean (median, range) hospital cost for those hospitalized, $	4019 (3153, 512-11 418)	4727 (2800, 895-21 451)	6683 (3848, 368-51 033)
Mean No. (range) of hospital days for all patients	1.7 (0-20)	1.8 (0-30)	2.0 (0-46)
Mean (range) hospital costs for all patients, $	873 (0-11 418)	923 (0-21 451)	133 (0-51 033)

*$P < .05$ for geriatric assessment unit vs control and second opinion internist vs control.
†Total number of hospitalizations (percent of patients with one or more hospitalizations).

despite numerous attempts, 180 (20%) said they were too busy or not interested, 41 (5%) said that they were too healthy or did not want extra visits with a physician, and 36 (4%) (in some instances a family member) declared that they were too ill.

In evaluating baseline health status assessed by interview, we excluded 10 patients who were judged to be incompetent by the interviewers. In assessing changes in health status over 3 months, we excluded an additional 35 patients (3 more who were judged to be incompetent by the interviewers, 25 who decided to drop out of the study or moved, and 7 who died). In evaluating changes between baseline and 1 year, we excluded an additional 29 patients (7 who dropped out of the study or moved and 22 who died). Overall, we excluded 74 patients—23 who were randomized to assessment, 23 who were assigned to internist consultation, and 28 who were control patients. Because the number excluded was comparable in the different groups and amounted to only 12% of the sample, bias is unlikely.

RESULTS

Tables 1 and 2 display sociodemographic characteristics of the patients, the percentage with specific medical problems, and their baseline scores on health status instruments. While the number of patients in the different groups varies because of our stratification procedure, with that procedure, age and sex had very similar distributions. There were no significant differences among groups in the prevalence of specific medical conditions. Baseline health status and satisfaction were also similar in the different groups (Table 2).

Overall, our study population appeared to be fairly healthy. Although a portion of the cohort was quite old or debilitated—roughly one fourth of the population was older than 80 years and more than 80 of the patients scored below 25 on Folstein and coworkers' Mini-Mental State test[22] (a score that indicates cognitive limitation) the large majority had no major impairments. Only a very small percentage of individuals had clinically important chronic conditions such as dementia, episodes of falling, and psychological disorders.

Content of the Geriatric Assessment and Second Opinion Internist Consultations

By abstracting consultation letters, we were able to obtain information regarding the content of the geriatric assessment and second opinion internist consultations (Table 3). Both groups identified a new diagnosis in approximately 30% of patients. They also advised further diagnostic testing and changes in medication for approximately 30% to 40% of the study sample.

Nevertheless, there were a number of significant differences in the content of care provided by the two groups. Compared with the internists, the geriatric assessment teams made significantly more new diagnoses ($P < .05$) and provided psychosocial evaluations more frequently ($P \leq .001$). They also suggested changes in medication regimens ($P \leq .001$) and in the provision of home ($P \leq .05$) and community services ($P \leq .001$) more often. Second opinion in-

ternists were more likely to have advised the use of additional blood tests ($P \leq .05$).

Effects on Health Status

Despite the changes in care suggested by the geriatric assessment teams and the consulting internists, there was little difference in outcomes between patients who received these interventions and the control patients. At both the 3- and 12-month follow-up examinations, there were no differences among groups in the number of patients hospitalized, admitted to a nursing home, or deceased (Table 4). Figures 1 and 2 show percentage changes in mean health status and satisfaction at 3 and 12 months after randomization compared with baseline measurements for patients who were randomized to the three different groups. After adjustment for baseline measures of covariates, cognitive function was significantly better ($P \leq .05$) for patients who received comprehensive assessment compared with control patients at 3 months. None of the other differences for the geriatric assessment group vs the control group was statistically significant at either 3 or 12 months.

Our analysis of subgroups and interactions described previously revealed few effects suggestive of differential benefit for the comprehensive geriatric assessment. None of the subgroup analyses was statistically significant. Analysis of interaction effects asked in a more formal and sensitive way whether geriatric assessment was associated with relatively greater benefit for those who were older, lived alone, or were initially in poorer health. The results were inconsistent. At 3 months, those patients who were older than 80 years improved relatively less from geriatric assessment in terms of social activity than those who were younger ($P < .05$). On the other hand, at 3 months, those patients who were older than 80 years improved relatively more from geriatric assessment in terms of cognitive function than did those who were younger ($P < .05$); and at 1 year, those who were initially in the lowest quintile of functional health benefited more from assessment in terms of satisfaction than did those who were initially in better functional health ($P \leq .05$). In summary, the interaction analyses did not consistently show greater benefit from assessment for those who were older, more debilitated, or living alone.

Use of Services

The experimental design required that all noncontrol patients have at least one office visit to the geriatric assessment team or to the physician who was providing a second opinion. This was reflected in the average number of office visits in the three groups: there was a greater number of visits per patient in the experimental groups compared with the control group (Table 4). Excluding the mandated consultation, there was no significant difference in numbers of visits. Other indexes of medical use were also statistically similar across groups (Table 4).

COMMENT

In this study, there were no differences among groups in mortality, nursing home placement, or hospitalization. Although patients randomized to geriatric assessment with limited follow-up achieved a statistically significant but clinically small benefit in cognitive function at 3 months, this advantage was not sustained at 1 year. There were no other areas of even temporary improvement. Analyses of subgroups and interaction effects for those at higher risk within the population—the old, the ill, and the functionally impaired—also showed no major benefit from geriatric assessment. Altogether, these results suggest that consultative geriatric assessment with limited follow-up did not benefit most elderly, ambulatory patients in an HMO.

We believe our study is the first randomized investigation to provide extensive information regarding the content of consultations by a geriatric assessment team compared with an internist. Compared with consulting internists, the geriatric assessment team was more likely to make a new diagnosis, to perform a detailed psychosocial assessment, and to recommend changes in medication regimens or the use of community services.

Because of the differences in process, the lack of discernible effect on outcomes is especially interesting. One key issue may be continuity. Our survey data have shown that existing geriatric assessment services vary as to whether they provide consultation alone or continuing care as well.[1] Our intervention included only telephone follow-up and was limited in duration. We explicitly designed this model because we thought that with constrained resources, it would be a format that HMOs and other providers might replicate. Although previous studies of comprehensive assessment in the acute-care hospital have in some instances shown benefit from consultation without follow-up after hospitalization,[10] prolonged contact by the geriatric assessment team with patients undoubtedly facilitates the implementation of their recommendations[7] and the ongoing adjustment of care plans. It is certainly possible that such an intervention would have been more effective.

In part, our results may also reflect the relative healthiness of the patient population. Although two previous European trials[16,17] showed efficacy for geriatric assessment performed in the home among untargeted community-dwelling ambulatory populations, other investigations of assessment directed at ambulatory individuals have not shown positive results.[14,15] Generally, trials of assessment with positive results have focused on older patients with severe, complicated problems, already in the hospital or facing critical decisions such as nursing home admission.[4,12] These studies coupled with our results thus suggest that if geriatric assessment is to be used effectively in the ambulatory setting, tight targeting of the most severely ill or medically unstable patients may be necessary.[28] Surprisingly, survey data suggest that for the majority of existing ambulatory geriatric assessment units, self-referral is the most common source of patients. Referral by a physician or long-term care facility, which might select more debilitated patients, is much less common.[1]

Another important feature of our study is the type of care provided to patients who were randomized into the control group. We chose RIGHA in part because we thought the physicians would be typical of those working in HMOs in the Northeast. The Rhode Island Group Health Association has no formal academic affiliation and the physicians have no special experience in caring for elderly patients (only 6% of the patient population at RIGHA is older than 65 years compared with 11% in the fee-for-service sector).[1] Nevertheless, most of the physicians at RIGHA are board certified, and our sense is that their standard of care is high. The HMOs, in general, may offer advantages by providing elderly patients with comprehensive and continuous care. It is possible that if the control group had been provided care at an alternative setting the relative benefits for the group that was randomized to receive geriatric assessment would have been greater.

The use of an "experimental" geriatric assessment team at the RIGHA may also have contributed to our findings. Because the team was not a regular part of the RIGHA (except during the period of this trial), suggestions offered by it may have been infrequently translated into care plans by the RIGHA's primary physicians. To evaluate this issue, we examined medical records to determine

how often the suggestions to perform diagnostic tests, modify medication schedules, or obtain consultations were actually carried out. Fifty-nine percent of the requests for diagnostic tests, 51% of the suggestions to change medication, and 42% of the requests for consultation were either ordered by the geriatric assessment team directly (generally with the primary physician's knowledge and approval) or subsequently ordered by the primary physician. This compares favorably with other studies of consultation that show results ranging from approximately 30% to 80%, depending on the type of service ordered and the setting.[29-36]

Because mortality and nursing home placement were gross outcomes that occurred infrequently, our ability to detect statistically significant intergroup differences was limited. We therefore focused on measures of health status and satisfaction with care that we thought would be especially sensitive and important outcomes in this population. In retrospect, our power was generally substantial. We estimated that at the .05 level our power to find a 10% improvement over the control group was 95% or greater for all the measures except satisfaction (power of 80%) and overall perceived health (power of 30%). Our power to find a 15% difference was at least 80% for all measures. For subgroups our power was, of course, smaller. Our regression analyses, which incorporated interaction terms, provided a more sensitive test of subgroup differences. Our power to detect a statistically significant ($P<.05$) interaction in the range considered "small"[37] was at least 80% for all measures except functional health where our power was 70%.

In summary, our study showed that provision of a single, consultative geriatric assessment with telephone follow-up did not produce any substantial health benefits for the ambulatory elderly population in an HMO. This finding seems especially important because at the majority of institutions, geriatric assessment is used for ambulatory rather than hospitalized individuals. Although data from other studies have shown that geriatric assessment employed for certain patients, in certain formats, and in certain settings can be beneficial, our results lead us to suggest caution in generalization of prior findings to less debilitated patient groups, more limited formats of care, and alternative settings. Further studies are required to define the optimal ways to develop and target geriatric assessment. The rapidly increasing use of this technology makes it important to obtain such information soon.

This research was supported by grants from the John A. Hartford Foundation, New York, NY, and the Massachusetts Fund for Cooperative Innovation, Boston, a Henry J. Kaiser Family Foundation (Palo Alto, Calif) Faculty Scholarship in General Internal Medicine (Dr Epstein), and a National Institutes of Aging (Bethesda, Md) Geriatric Academic Medicine Award (Dr Fretwell).

We thank the Department of Internal Medicine, the personnel in Medical Records, and the administrative staff at the Rhode Island Group Health Association, Providence, for their helpful and important participation in this study.

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