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Preventing Disability and Falls in Older Adults: A Population-Based Randomized Trial

ABSTRACT

Objectives. Because preventing disability and falls in older adults is a national priority, a randomized controlled trial was conducted to test a multicomponent intervention program.

Methods. From a random sample of health maintenance organization (HMO) enrollees 65 years and older, 1559 ambulatory seniors were randomized to one of three groups: a nurse assessment visit and follow-up interventions targeting risk factors for disability and falls (group 1, n = 635); a general health promotion nurse visit (group 2, n = 317); and usual care (group 3, n = 607). Data collection consisted of a baseline and two annual follow-up surveys.

Results. After 1 year, group 1 subjects reported a significantly lower incidence of declining functional status and a significantly lower incidence of falls than group 3 subjects. Group 2 subjects had intermediate levels of most outcomes. After 2 years of follow-up, the differences narrowed.

Conclusions. The results suggest that a modest, one-time prevention program appeared to confer short-term health benefits on ambulatory HMO enrollees, although benefits diminished by the second year of follow-up. The mechanisms by which the intervention may have improved outcomes require further investigation. (*Am J Public Health.* 1994;84: 1800–1806)

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Introduction

The rapid aging of the American population has fueled debate over whether the morbidity associated with advanced age can be delayed or compressed by interventions to prevent disability.[1–4] Although health promotion or wellness programs for older adults are not new,[5] the few published randomized, controlled clinical trials of interventions to modify risk factors for disability have generally been limited to intensive exercise programs of short duration involving small numbers of volunteers.[6]

We evaluated the effects of a modest preventive intervention targeting risk factors for disability and falls among nondisabled older health maintenance organization (HMO) enrollees. As its primary outcome goal, the trial adopted the surgeon general's 1979 objective for older adults: to reduce days of restricted activity due to illness.[7] Because the epidemiological literature suggested several behavioral risk factors for disability or falls, including physical inactivity, alcohol or prescription drug misuse, home safety hazards, and sensory impairments,[8] the experimental intervention, based on a conceptual model described previously,[9,10] focused on these factors.

More recent longitudinal studies of older adults have confirmed that inactivity increases the risk of disability.[9,11] Some studies have shown that heavy alcohol intake is a risk factor for disability,[12–14] but there is little evidence linking it to falls.[15–18] Visual impairment appears to increase the risk of falls[17,19,20] and, in one study, the risk of disability.[21] The use of centrally acting psychotropic drugs has also been associated with an increased risk of falling[20,22] and loss of function.[23] These newer studies provide further support for the notion that altering such risk factors might prevent or at least delay the onset of disability and falls.[24,25]

Methods

Experimental Strategy

The effectiveness of a disability and fall prevention intervention was evaluated among senior HMO enrollees in a demonstration project using a randomized, controlled trial design. The principal comparison was between the experimental intervention (nurse visits with follow-up behavioral interventions) and usual HMO care. Because of concerns that the interaction with the nurse might be an effective intervention in itself, independent of any attention to risk factors for disability and falls, the design included a third group that received only a nurse visit for chronic disease prevention. Figure 1 illustrates the research design.

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Editor's Note. See related editorial by Patrick (p 1723) in this issue.

Setting and Subjects

The study population comprised randomly sampled enrollees of Group Health Cooperative of Puget Sound who were 65 years and older, ambulatory, and independent in activities of daily living. Group Health Cooperative is a large staff model HMO providing comprehensive services to more than 370 000 people in western Washington, including more than 40 000 who are 65 years and older.

From among those aged 65 and older receiving care at three large Seattle Group Health Cooperative clinics, 5240 individuals were selected at random. Figure 1 shows the sampling and exclusions. The primary care physicians of sampled enrollees excluded any subjects who were too ill to participate in the trial (8%). The remaining subjects received an introductory letter, followed by a mailed program description and baseline questionnaire. A second questionnaire was sent to those not responding. Of the original random sample, 36% returned completed consent forms and questionnaires; 13% refused participation; 2% were ineligible because they were institutionalized, seriously ill, or out of the area; and 41% failed to respond. Participants were more educated, more affluent, less likely to smoke, and more involved in community activities than nonrespondents, but the health status of both groups was similar.[26]

Of those returning completed questionnaires, 400 individuals (8% of the original sample) were excluded because they reported difficulty with ambulation or with one or more activities of daily living, and an additional 1% refused further participation. Thus, 1559 older Group Health Cooperative enrollees (30% of the original random sample) were randomized to the three groups in a ratio of 2:1:2. This allocation ratio was selected to ensure sufficient power in the main comparisons between the experimental and usual care control groups.

Group 1: experimental intervention. The goal of the experimental intervention was to modify risk factors for disability and falls among seniors considered to be at risk. Specific interventions targeted those seniors who were physically inactive, drank alcohol to excess, had hazards in the home (for those with an increased risk of falls), used prescription drugs that increased the risk of falls or mental impairment, or had uncorrected hearing or visual impairments. The specific criteria used to define those at high risk appear in the footnotes to Table 1.

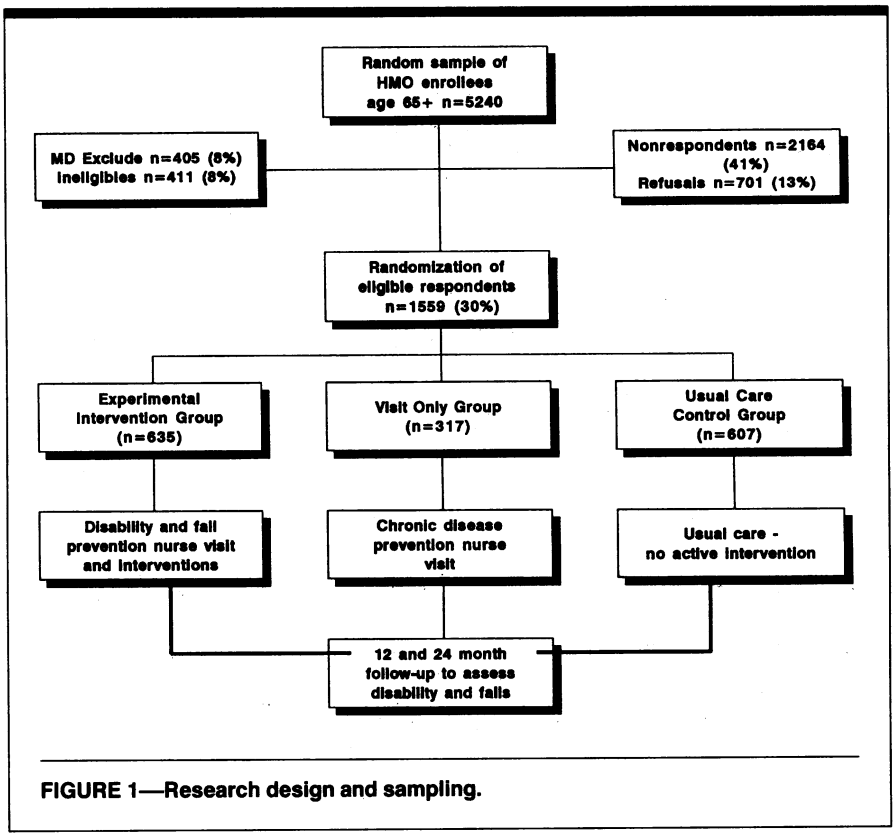

FIGURE 1—Research design and sampling.

Individuals in group 1 received invitations to attend a 60- to 90-minute visit with a specially trained nurse/educator. The objectives of the visit were to review risk factors assessed on the baseline questionnaire, perform screening audiometry and blood pressure measurement, develop a tailored follow-up intervention plan to address identified risk factors, and motivate seniors to increase physical and social activity.

The follow-up options included interventions for each of the six risk factors mentioned above. The exercise intervention, which was designed for this study, consisted of a 2-hour exercise orientation class that tested fitness using a timed walk of one-quarter mile and used instruction and encouragement to begin a program of brisk walking. The alcohol intervention included screening and referral to the Cooperative's alcohol treatment program for those with suspected alcoholism; for those at high risk but not meeting the criteria for alcoholism, a booklet was provided that was designed by the project team and that highlighted both the pharmacological effects of alcohol in older adults and behavioral strategies for limiting use. The nurse encouraged seniors at high risk of falling to have home safety inspections conducted either by a trained volunteer or by the participant or family with guidance from an instructional home safety checklist.

For each intervention subject, the nurse received a drug profile generated from the Cooperative's computerized pharmacy database. After the visit, the nurse notified a pharmacist about those seniors taking psychoactive drugs (psychotropics and cardiovascular agents such as sedative-hypnotics, tranquilizers, antidepressants, and alpha- and beta-blockers), paying particular attention to those who reported drowsiness or dizziness. The pharmacist reviewed the drug and questionnaire data, examined the medical record if needed, and made written recommendations for regimen changes to the patient's primary care team.

Interventions for the hearing and vision impaired were designed primarily to provide supports and encouragement, not medical treatment. Patients with previously unknown or untreated hearing deficits were referred for formal audiological and hearing aid evaluation. Behavioral intervention classes were provided for patients with uncorrectable hearing deficits. Seniors with uncorrectable visual impairments received information about resources in the community designed to

TABLE 1—Prevalence of High-Risk Status at Baseline, by Treatment Group

Risk Category	Treatment Group, % Intervention	Visit Only	Usual Care	P[a]
Inadequate exercise[b]	65.2	73.0	65.7	0.04
High-risk alcohol use[c]	29.4	28.2	26.7	0.59
Increased fall risk[d]	57.2	53.0	53.9	0.36
High-risk prescription drug use[e]	57.2	54.3	53.4	0.38
Impaired vision[f]	12.0	7.9	12.7	0.08
Impaired hearing[g]	8.1	5.1	6.1	0.18

[a]Chi-square test (2 *df*) across treatment groups.
[b]Subject exercised less than three times weekly for 15 minutes to the point of sweating or getting out of breath.
[c]Consists of one or more of the following: subject drank alcoholic beverages at least three times per week in past month; usually had at least three drinks per occasion; had at least five drinks on one occasion in past month; had at least three drinks and then drove a car on at least one occasion in the past 12 months.
[d]Subject fell in past year or at age 75 or older.
[e]Subject took specific cardiovascular, psychotropic, or narcotic medications.
[f]With glasses, subject was unable to read newsprint or recognize a friend across the street; or vision problems were not correctable, and subject had difficulty doing such things as reading, seeing the numbers on the telephone, or telling whether the stove was on or off.
[g]With or without a hearing aid, subject could not usually hear and understand what a person was saying without seeing the person's face if the person either whispered or spoke in a normal voice from across a quiet room.

assist those with poor vision in maintaining activity and function.

The nurse provided follow-up phone calls and mailed reminders. One or two follow-up phone calls were made in the first month after the visit for those receiving interventions. Written summaries of risk factors and the prevention plan were placed in the subject's medical record in hopes that the primary care team would reinforce intervention efforts.

Group 2: nurse visit only. The nurse-visit-only group received an invitation to attend a chronic disease prevention visit with a different set of nurses. This visit focused on assessments and counseling relevant to cardiovascular disease prevention (smoking, diet, hypertension control, stress management), breast and cervical cancer detection, influenza vaccination, and seat belt use. Exercise was not emphasized. Follow-up activities were limited to existing pamphlets and classes available at Group Health Cooperative.

Group 3: usual care controls. Usual care controls received no specific preventive interventions.

Data Collection

Mailed questionnaires at baseline, and at 1 and 2 years after randomization, provided the primary evaluation data. The baseline questionnaire sought detailed information about sociodemographic characteristics, health and functional status, and health practices. Follow-up questionnaires contained an abbreviated set of baseline items.

The health status measures used have been described in detail previously.[27] The primary outcome measures used in this analysis were restricted activity days,[28] days spent in bed, and the Medical Outcomes Study physical limitations scale.[29,30] Restricted activity days were ascertained by asking the following questions: (1) "In the past 12 months, did you cut down the things you usually do, such as going to work or working around the house, because of illness or injury?" (2) "If yes, how many days did you cut down on the things you usually do because of illness or injury?" Bed days were assessed in similar fashion, substituting the phrase "how many days did you stay in bed?" Because the distributions of these variables were so highly skewed, they were categorized into five groups (0, 1 to 7, 8 to 30, 31 to 179, and 180+ days). Our previous studies have documented the cross-sectional construct validity of these grouped measures[27] and their responsiveness to change.[31] In the responsiveness analyses, an increase of two disability-day groups (e.g., from 0 days to 8 to 30 days) best discriminated between older individuals with and without major intervening health problems. This was our primary measure of functional decline.

The physical limitations scale asked for the presence and duration of health-related limitations in six activities ranging from vigorous activities such as running to activities of daily living such as eating, bathing, and dressing. The items conformed to a Guttman scale,[27] and respondents were given a score ranging from 0 to 6, where 0 indicated no limitations in any activity and 6 indicated limitations with self-care activities. A decline in function was defined as an increase of two or more points, as suggested by the responsiveness study.[31]

The incidence of falls was assessed from self-reports of episodes of "falling to the ground in the past year" and from computerized hospital discharge files. Subjects reporting falls were asked whether they had been injured (injurious fall) and, if so, whether they had received medical attention for the injury (medically attended fall). The Cooperative's computerized hospital discharge abstracts provided data on falls requiring hospitalization (*International Classification of Diseases,* 9th edition [ICD-9] codes of E880 to E888); its computerized utilization files were the source of data about inpatient utilization.

The 1- and 2-year follow-up questionnaires were administered by mail. If mailed responses were not returned (as occurred with fewer than 5% of respondents), respondents were interviewed by telephone. The response rate for each follow-up survey was 97%. Those lost to follow-up included 53 deaths, 18 refusals to participate, 15 who were too ill to be interviewed, 2 who were institutionalized, and 1 who could not be contacted; these were distributed proportionally across intervention groups.

Statistical Analysis

Analysis of variance and chi-square statistics were used to test for differences in the distributions of baseline variables among the three randomized groups. During each year of follow-up, intervention effects were tested for by using a *t* test to compare the experimental group first with usual care controls and then with the visit-only group. Continuous variables that were highly skewed were quantitatively transformed (e.g., blocks walked per week were log transformed). All continuous variables (e.g., the number of falls) were also analyzed nonparametrically as ranks using Mann-Whitney tests.

For the three measures of disability, changes in function from baseline to year 1 (or baseline to year 2) were examined in four categories. Those increasing or decreasing by two or more disability-day groups or by two or more Medical Outcomes Study points were designated as worsened and improved, respectively.

Those who began with the highest level of function and declined one category or point or less were labeled sustained high function. Those who stayed within one group or point of an initially lower level of function were labeled sustained limited function. Chi-square tests were used to test for differences in the distributions of these categories across treatment groups. The four categories were then collapsed into two (worsened and not worsened), and chi-square tests were used to compare the differences in the proportions of each treatment group that showed worsened function.

The effects of treatment group on the four outcome measures were also examined after adjustment for baseline sociodemographic and health variables using least squares and logistic regression. The variables included in the models were age, sex, income, education, self-evaluated health, hospitalization in the previous year, and the risk factors shown in Table 1. Adjustment made only trivial differences in the measures of effect or *P* values, so only unadjusted values are shown here.

Results

Baseline prevalence rates of the targeted risk characteristics are shown by treatment group in Table 1. Approximately two thirds of the randomized participants reported inadequate exercise levels, and the visit-only group had a significantly higher prevalence of inadequate exercise. More than half of each group used psychoactive drugs or met our age and fall-history criteria for increased fall risk. Between 25% and 30% of seniors engaged in one or more high-risk alcohol practices. While the experimental group had slightly higher prevalence rates of high-risk alcohol use, increased fall risk, and high-risk prescription drug use, none of these differences was statistically significant.

Ninety percent of the experimental and visit-only groups attended the nurse assessment visit. Of those meeting the various risk criteria, 40% attended the exercise session, 65% received the alcohol booklet and an additional 15% were referred for evaluation of possible alcohol addiction, 78% received a pharmacist review, and essentially all those at risk for falls or uncorrectable visual problems received written materials. Fewer than 20% of those at risk for falls accepted the home safety inspection by the trained volunteer; the remainder chose the self-administered checklist. Of those patients with hearing deficits on screening, two thirds were referred for audiological evaluation and one third for behavioral intervention classes; 80% of that third attended. Review of medical records after the intervention revealed little written evidence of activity by primary care physicians in response to recommendations.

TABLE 2—Baseline Demographic and Health Characteristics, by Treatment Group

	Treatment Group[a]		
	Intervention (n = 635)	Visit Only (n = 317)	Usual Care (n = 607)
Age, y (mean)	72.5	72.6	72.5
Sex, % women	60	57	59
Race, % non-White	6	8	7
Income, % <$15 000	35	35	33
Education, % college graduate	26	24	26
Restricted activity days in last 12 months, % in each group			
0 days	72	74	74
1–7 days	12	9	11
8–30 days	9	8	10
31–179 days	6	5	4
180+ days	1	3	2
Medical Outcomes Study physical function, % in each group			
0	41	38	40
1	25	24	27
2	9	8	7
3	10	14	10
4	14	16	15
Falls in last 12 months, % falling			
Any	35	31	33
Injurious	9	8	11
Medically attended	7	7	7
Hospitalized	0.6	0.6	0.2
Hospitalized in year prior to baseline, %	17	14	14

[a]There were no significant differences among the groups for any characteristic at the $P = .05$ level.

Table 2 shows selected demographic and health characteristics of the participants. The participants' average age was 73 years and 59% were women. They were predominantly White, one fourth were college graduates, and two thirds had family incomes greater than $15 000 per year. Because of the exclusions, the study population was relatively healthy. There were no significant differences among treatment groups in the distributions of any of the baseline demographic or health variables.

Table 3 shows the distribution of change categories for the three measures of function by treatment group. Most participants maintained their baseline level of function over the 2 years of follow-up. However, the percentage of each group who experienced a worsening of functional status during the first year of follow-up was significantly lower in the experimental group than in the usual care controls for all three measures. The differences in percentages with worsened function between groups 1 and 3 were 6% (95% confidence interval [CI] = 2.7%, 9.3%) for restricted activity days, 3% (CI = 0.7%, 5.3%) for bed days, and 5% (CI = 0.7%, 9.3%) for the physical function measure. The visit-only group experienced an intermediate level of functional decline that was not significantly different from that of either of the other groups.

After 2 years of follow-up with no active interventions occurring during the second year, the percentages of each group whose function worsened from baseline did not differ significantly between the intervention and control groups.

TABLE 3—Change in Disability Days and Physical Function, by Treatment Group

Outcome Variable Change Status	Change from Baseline to 1 Year, %			Change from Baseline to 2 Years, %		
	Intervention	Visit Only	Usual Care	Intervention	Visit Only	Usual Care
Restricted activity days[a]						
Sustained high function	60	60	56	58	60	57
Sustained limited function	23	19	20	23	16	22
Improved	9	10	11	9	10	10
Worsened	7	11	13[b]	9	14[b]	11
Bed days[a]						
Sustained high function	61	62	57	60	61	58
Sustained limited function	33	31	33	32	31	34
Improved	3	3	4	4	3	3
Worsened	3	4	6[b]	4	5	5
Medical Outcomes Study physical function score[a]						
Sustained high function	27	23	24	25	24	24
Sustained limited function	48	47	45	47	51	44
Improved	10	13	11	11	10	11
Worsened	15	17	20[b]	17	15	21

[a]For bed days and restricted activity days, a change of two or more categories was required for someone to be classified as improved or worsened. For the physical function score, a change of two points or more was required. "Sustained high function" indicates that the person had the highest function level at both baseline and year 1 follow-up (0 bed or restricted activity days, 0 on the physical function scale), indicating no limitations.

[b]Significant difference compared with intervention group in the percentage who worsened versus the percentage who did not (sustained high function, sustained limited function, and improved) at $P \leq .01$ (chi-square test, 1 *df*).

The only exception was that the experimental group had a significantly lower proportion of participants who reported an increased number of restricted activity days than the visit-only group ($P < .01$).

In addition to looking at changes in categories, we also examined changes in the mean number of disability days or mean physical function scores over the 2 years (data not shown). At the end of the first year of follow-up, the experimental group reported 3 fewer restricted activity days ($P < .05$) and 1.3 fewer bed disability days ($P < .01$) than the usual care control group. The physical function score worsened in all treatment groups over time, but the experimental group reported significantly fewer limitations than the usual care control group at the first year of follow-up (mean limitations of 1.47 vs 1.70, $P < .05$). The visit-only group again experienced intermediate levels of disability at 1 year. Differences again were no longer statistically significant at 2 years.

Table 4 shows the percentage of each group experiencing falls of varying severity during the follow-up period. In the first year of follow-up, significantly fewer members of the experimental group reported falling than members of the usual care group (difference = 9.3%; CI = 4.1%, 14.5%). The difference reflected the fact that the percentage falling declined in the experimental group and increased in the usual care group. Self-reported injurious and medically attended falls showed a similar pattern, with the former reaching statistical significance for the experimental-usual care difference. Although fewer than 1% of subjects were hospitalized for a fall-related injury, the incidence of such injuries declined during the year after intervention in the visit groups and increased in the control group. Fall rates in all categories did not differ between intervention and visit-only groups. There were no significant differences between groups during the second year of follow-up.

We postulated that any effectiveness of the disability and fall prevention intervention should be related to a reduction in risk factors. As shown in Table 5, experimental group participants reported exercising somewhat more regularly than either the visit-only group or the usual care control group at both the 1- and 2-year follow-up. On average, older adults in the experimental group were walking seven more blocks per week than older adults in the usual care control group. However, none of these differences was statistically significant.

In addition, a significantly higher proportion of older adults in the experimental group reported a home inspection for safety hazards during follow-up than in either the visit-only or the usual care groups. No significant differences between the experimental group and the control groups were found for the proportions with high-risk alcohol consumption, use of high-risk prescription drugs, or prevalence of uncorrected hearing or vision impairments.

Over the 2 years of follow-up, the mortality rates were 2.6% in the intervention group, and 4.1% and 3.7% in the visit-only and usual care control groups, respectively. The differences in mortality rates were not statistically significant.

Discussion

Ambulatory senior HMO enrollees who were offered a modest intervention program designed to reduce their risk factors for disability and falls reported a significantly lower incidence of new disability and fewer falls over a 1-year period compared with usual care controls. The differences diminished after 2 years of follow-up. A second group, who received only a chronic disease prevention visit with a nurse/educator, experienced an intermediate level of new disability and incidence of falls, similar to that of the intervention group. The differences between the experimental group and the visit-only group were generally not statistically significant, but the power of these comparisons was limited by the smaller sample in group 2.

Were these time-limited reductions in disability and falls of clinical or public health significance? Several limitations must be considered in interpreting the results. First, most of the findings rely on self-report. Among older adults, self-administered interviews result in large amounts of missing information[32] and the overreporting of falls.[33] The frequency

TABLE 4—Percentage of Subjects Falling during Follow-Up, by Type of Fall and Treatment Group

Type of Fall	Treatment Group, %		
	Inter-vention	Visit Only	Usual Care
All falls[a]			
Year 1	27.5	29.6	36.8[c]
Year 2	31.4	29.3	29.2
Injurious falls[a]			
Year 1	9.9	10.1	14.5[c]
Year 2	13.4	9.2	10.1
Medically attended falls[a]			
Year 1	6.6	6.0	9.4
Year 2	9.1	8.5	7.4
Hospitalized falls[b]			
Year 1	0.47	0.32	0.82
Year 2	0.63	0.63	0.99

[a]Self-reported.
[b]From Group Health Cooperative utilization database.
[c]$P < .01$ for difference with intervention group.

TABLE 5—Prevalence of Health Behaviors, by Treatment Group at 1 and 2 Years of Follow-Up

Health Behavior	Treatment Group		
	Intervention	Visit Only	Usual Care
Exercise			
Exercise > 15 minutes 3 times/week, %			
Year 1	37.1	33.1	34.1
Year 2	34.9	30.4	30.5
Number of blocks walked per week, mean			
Year 1	53.3	47.3	46.4
Year 2	52.2	47.7	45.8
Alcohol use: high-risk drinking, %			
Year 1	25.9	23.8	24.1
Year 2	22.6	23.1	21.4
Home safety: home inspection, %			
Year 1	37.0	26.3[a]	24.2[a]
Year 2	31.3	25.5	24.1[a]
Prescription drug use: taking high-risk drug, %			
Year 1	59.2	53.6	54.7
Year 2	59.7	58.4	58.8
Hearing: hearing impairment, %			
Year 1	7.8	7.0	7.2
Year 2	6.6	5.9	7.2
Vision: uncorrected vision problem, %			
Year 1	12.4	13.0	9.8
Year 2	12.8	13.6	12.9

[a]Chi square test (1 *df*) comparing usual care or visit groups with intervention group; significant difference at $P \leq .01$.

with which this occurred was similar among the treatment groups. Although the study could not be blinded, the written materials and the nurse visit emphasized the targeted risk factors, not disability and falls. Thus, biased reporting, if present, should have been more evident with respect to the targeted risk factors than to the outcomes, and we found few differences in risk factors.

Second, the interventions were brief, largely self-directed, and of low intensity, and participation rates in intervention components were limited. Further research will be needed to confirm whether such compressed, lightly supervised programs can consistently produce such apparent benefits. We would be more confident in attributing the findings to the intervention if we had been able to find larger differences in the targeted behaviors between groups. Only differences in the frequency of home safety inspection favoring the experimental group reached statistical significance. Differences in physical activity, while in the same direction, were not significant. These findings suggest that either the trends in home safety and physical activity in the first year of follow-up, which favored the experimental group, were clinically important, or some other aspect of the intervention produced the positive impact.

One possibility is the visit with a trained nurse/educator. While the nurse visits in group 1 differed from those in group 2 in content, focus and intensity of follow-up activities, and follow-up telephone contact, the nurse visits were highly valued by the participants in both groups and may have had positive effects on health independent of attention to specific risk factors. In a survey after the experimental and visit-only nurse visits, one half of both groups reported making lifestyle changes as a result of the visit. Although there were no statistically significant differences in outcomes between the two nurse-visit groups, the consistently better year 1 functional outcomes in group 1 patients suggest more than a nonspecific nurse visit effect.

The subjects in the trial were nondisabled, largely White, and generally well-educated HMO enrollees. The differences between participants and typical HMO enrollees in this age group were primarily sociodemographic rather than health related.[26] We were less successful in enrolling less educated, lower income, and less socially involved older adults. While the fact that we studied an educated, health-conscious population does not threaten the internal validity of our findings, it limits the public health implications of the results.

Despite the limitations, the trial had many strengths: the randomized design, the large sample sizes, the nearly complete follow-up, and the relationship of randomized subjects to a known population. Although biased reporting or other methodological problems may have contributed to the effects at 1 year, differences favoring the experimental intervention over usual care were observed with all the outcome variables studied. The differences among groups at 12 months were evident with absolute measures as well as measures of change. The experimental group had an incidence of declining functional status that was 50% to 75% that of the usual care group. We used an increase of at least two disability-day categories or physical function levels as evidence of worsened function; our prior work showed this magnitude of change to be clinically significant.[23,31] For example,

women who met this definition of worsened functional status consumed more than twice the amount of health care resources as those who maintained good function.[23]

We believe that the results warrant further testing of modest disability and fall prevention programs for ambulatory, nondisabled older adults. However, the evidence also indicates that any effects will dissipate if the intervention is not sustained over time. More intense, supervised exercise programs consistently enhance physiological reserve and performance in older adults[6] and should probably be routinely included in such disability and fall prevention interventions. Intensifying and sustaining the intervention without making costs prohibitively expensive for public health application will be a challenge for future research in this area. □

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