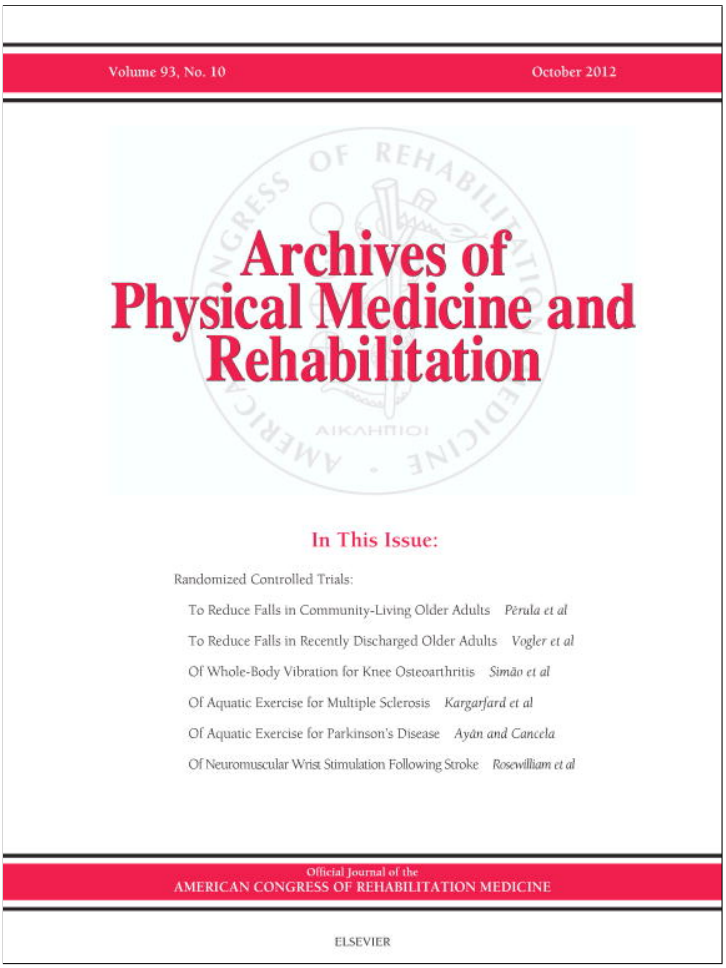

ORIGINAL ARTICLE

Effectiveness of a Multifactorial Intervention Program to Reduce Falls Incidence Among Community-Living Older Adults: A Randomized Controlled Trial

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ABSTRACT. Pérula LA, Varas-Fabra F, Rodríguez V, Ruiz-Moral R, Fernández JA, González J, Pérula CJ, Roldán AM, de Dios C, and the EPICA Study Collaborative Group. Effectiveness of a multifactorial intervention program to reduce falls incidence among community-living older adults: a randomized controlled trial. Arch Phys Med Rehabil 2012;93:1677-84.

Objective: To determine the effectiveness of a multifactorial intervention program to prevent falls among older adults as compared with a brief intervention.

Design: Randomized controlled trial.

Setting: Eleven health centers located in Córdoba, Spain.

Participants: People over 70 years old (N=404), who are residents in the community.

Interventions: The centers were randomized to either 1 of the 2 groups: intervention group (IG), of a multifactorial nature (individual advice, information leaflet, physical exercise workshop, and home visits), or control group (CG) (brief individual advice and information leaflet).

Main Outcome Measures: Fall rates and time until the fall; estimates of the relative and absolute risk of falls; and survival analysis and Cox regression.

Results: Of the patients recruited, 133 were in the IG and 271 were in the CG. Around 33% in the IG and 30.25% in the CG had had a fall in the previous year ($P=.56$). After 12 months, the fall incidence rate was 17.29% in the IG and 23.61% in the CG (relative risk=0.73; 95% confidence interval [CI], 0.48–1.12; $P=.146$). Around 60% of the IG patients said they had increased the time spent on physical activity. In the IG, the incidence of falls at home was 27.5% compared with 49.3% in the CG ($P=.04$). Being a woman (odds ratio [OR]=1.62; 95% CI, 1.03–2.54), having a history of falls (OR=1.15; 95% CI, 1.05–1.26), suffering acute health problems (OR=2.19; 95% CI, 1.09–4.40), and doing moderate exercise (OR=1.91; 95% CI, 1.08–3.38) were found as factors associated with a higher risk of falls.

Conclusions: Although the reduction of falls in the IG was nearly halved, and after the intervention there was a significant reduction in the number of falls at these patients' homes, the multifactorial intervention program is no more effective than the brief intervention to reduce the overall risk of falls.

Key Words: Accidental falls; Aged; Rehabilitation.

FALLS IN PEOPLE OVER 65 years of age is a problem, which has important consequences for health, apart from social and economic costs. About 1 in 3 people over the age of 65 and living in the community experience a fall each year. Its incidence increases with the increasing age of the studied population. Half of the people over 65 who have had a fall will fall again in the following year.[1,2] Approximately 1 of every 4 falls causes physical injuries; fractures occur in 5% to 6% of cases. Falls are the leading cause of death by accident in this age group.[3,4] Falls also have important social and psychological consequences. Between 30% and 75% of senior citizens who have fallen once admit they are afraid to fall again, which limits their regular activities and causes social isolation.[5,6] Around half of falls occur at home[7]; therefore, taking specific measures to modify the home environment to prevent falls can be beneficial for high-risk people.[8]

List of Abbreviations

CG	control group
IG	intervention group
PC	primary care
POMA	Performance Oriented Mobility Assessment

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The majority of falls among older adults are the result of interactions between various personal and environmental risk factors.[9,10] Many of these factors are potentially modifiable; therefore, their identification allows implementation of prevention strategies. Systematic reviews suggest that the most effective interventions to prevent falls are those including multifactorial programs, especially those involving doing some exercise.[3-17] However, a meta-analysis concludes that such multifactorial interventions do not achieve better results than simple interventions.[18]

In Spain, medical attention to these people falls on primary care (PC) teams, which are made up by the family physician and a nurse. Yet, these professionals see these patients in the context of comprehensive care, which, usually and increasingly, prioritizes the control of chronic diseases but does not generally include systematic actions toward the prevention of such chronic problems. This is reflected in the scarcity of studies that have been carried out to determine whether any multifactorial interventions feasible in this context and conducted by PC staff are effective or not.[18,19]

The objective of this research is to verify if a simple multifactorial intervention program, which is applicable in PC settings, is more effective to decrease fall incidence than brief advice for community living adults aged 70 or older.

METHODS

Design and Study Population

A clinical trial was designed that was controlled, multicentered, open, and randomized by cluster at 2 parallel arms in a ratio of 1:2 and stratified by type of health center (urban and rural). The study was carried out at 11 health centers in Córdoba, Spain.

The health centers were randomized, stratified by population area (urban or rural) to 1 of the 2 groups. The assignment was performed using EPIDAT version 3.1.[a] We used a sequence of numeric codes assigned to each center. The manager of the random selection was kept blind. Patients were recruited by consecutive sampling by their family doctors or nurses, when they attended the consultations. The criteria for inclusion were: men and women of 70 or more years residing in the community, ability to walk independently (ability to walk outside without assistance from another person), and informed consent. The exclusion criteria included the following: institutionalized, immobilized or bedridden, a terminal disease or severe psychiatric illness present, and contraindications to physical exercise. Recruitment was carried out during 18 months. Participants were followed-up for 12 months. All were informed about the objectives of the research and signed informed consent. The research was authorized by the ethics and local clinical research committee.

The sample size was calculated by taking the percentage of falls as the main variable of result. The reviewed bibliography[20,21] estimates that the annual percentage of falls in the community is 30%. Assuming a reduction of 15% of falls in the intervention group (IG) and 5% in the control group (CG) for an alpha error of 5%, a beta error of 20%, and a losses percentage of 15%, the necessary number of subjects was 142 in the IG and 284 in the CG. We chose a 1:2 ratio to improve the efficiency of the study, because intervention in the IG required the implementation of a series of important resources.

Interventions

The health centers' medical personnel (family doctors, nurses, and physiotherapists) performed the interventions, coordinated by a specialist in physical medicine and rehabilitation. The IG received a multifactorial approach with group and individual activities (appendix 1). The exercise program was designed following the principles described by Campbell,[22,23] Lord,[24,25] and colleagues. The workshop included blended exercises for improving flexibility, muscle strength, balance, and gait. Physical activities guidelines were provided in order to improve the aerobic conditioning. Participants received five 90-minute sessions over 3 weeks of treatment. At the end of the sessions participants received a handbook with additional instructions to be implemented at home.

To compensate the possible increase of falls with the levels and type of physical activity, time was limited to 120 minutes or more a week of moderate exercise. Moderate physical activities were explained to the workshop participants as "those that require a physical effort that make them breathe a bit harder than normal." We consider moderate physical activities as those between 4 and 6 metabolic equivalents of tasks, such as walking at 5 to 6km/h, riding a bicycle on level ground, swimming at a slow pace, doing exercise using light weights (2–5kg), and gardening.

The CG participants received a minimal intervention—a brief piece of advice at the consultation on falls prevention and an information leaflet—and received the usual clinical care in their health center. All patients participated in follow-up visits after 3, 6, and 12 months; IG patients had an additional visit at month 9 (the specific aim for this visit was to verify environmental changes recommended to reduce the risk of falling).

Measurements

A notebook data collection was developed with the sociodemographic data, clinical and functional assessment variables, as well as the evaluation of falls. A fall was defined as "any incident that brings a person down to the ground against their will."[26] We used the World Health Organization questionnaire about falls among older adults.[26] This questionnaire evaluates the risk of falls in older adults, and includes variables of a different nature, among which are 17 questions that assess the cause of the fall, some possible circumstances, and possible consequences. The questionnaire underwent a process of piloting in the previously conducted study on the prevalence of falls,[20] in order to check clarity of questions and reliability. Regarding falls, we considered the number and percentage in the 12 months prior to the start of the study, as well as the number in the months prior to each follow-up revision, characteristics, and physical and psychological consequences and patients' fear of falling. The way to check whether or not patients followed the recommendations was by self-report, through a close-ended question included in the notebook data collection, which was similar for both groups.

Regarding prescribed medication, we recorded the number and type of each drug—identified according to the anatomical-therapeutic classification by the European Pharmaceutical Market Research Association (International Vademecum).[27] The following groups of drugs were considered as associated with the risk of falls: diuretics, tranquilizers, hypnotic, antidepressants, neuroleptic, antiarrhythmic type inhibitors angiotensin, and digoxin.[28,29] We used the Tinetti (Performance Oriented Mobility Assessment [POMA]) test to explore gait and balance.[30] The POMA allows the systematic exploration of gait and balance. This test checks for 22 variables corresponding with different positional changes and maneuvers used with gait, resulting in a final score for each dimension (the higher the score the better state).

We recorded how long the participants walked every week and whether they performed some other type of physical exercise in their spare time, for which we used the first 4 ques-

tions of the International Physical Activity Questionnaire, validated in Spanish.[31]

The questions are related with the time the patient practiced physical activity (eg, walking, gymnastics, working in the yard or garden, bowling, dance, fishing, cycling, swimming) during their free time in the last 7 days.

For home visits, we used the checklist to avoid falls at home, published by the National Center for Injury Prevention and Control of the Center for Disease Control and Prevention,[32] which explores the major environmental risk factors for falls in each part of the house, detects them, and recommends ways to eliminate them.

We interviewed patients and reviewed their medical records in order to check if some other health problems were present. Health problems were classified into acute (eg, those self-limited conditions usually well defined, ie, vertigo, back pain,

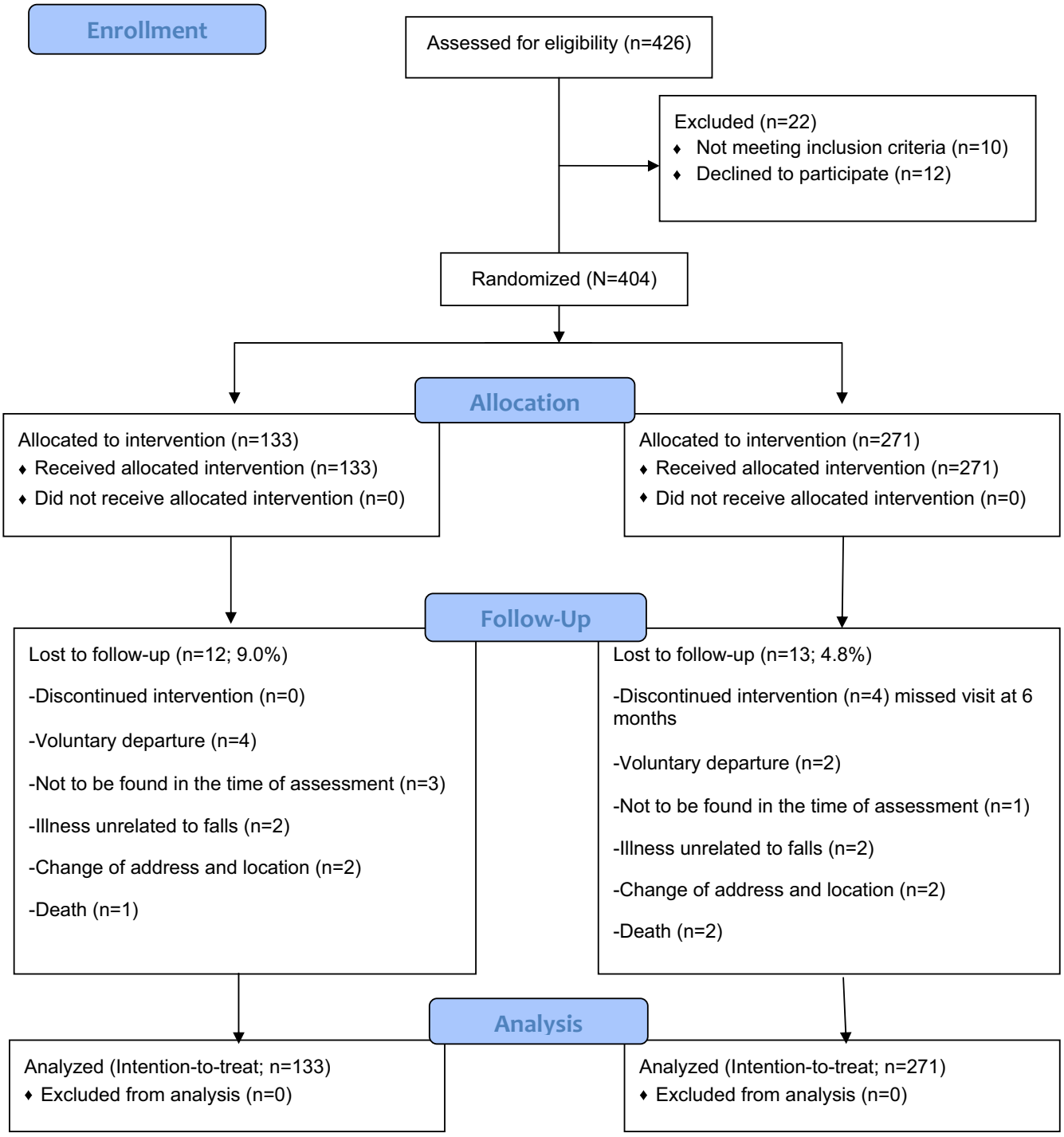

Fig 1. EPICA study flowchart.

Table 1: Basal Characteristics of the Study's Population

Characteristics	IG (n=133)	CG (n=271)	*P*
Age (y)	76.30±3.85	76.46±4.62	.720*
Women	79 (59.4)	136 (50.2)	.810†
Comorbidity	75 (56.4)	175 (64.6)	.110†
Marital status			.077†
Married	91 (68.4)	200 (73.8)	
Widower	34 (25.6)	63 (23.2)	
Separate	3 (2.3)	0 (0.0)	
Single	5 (3.8)	8 (3.0)	
Social class			.079†
I (highest)	0 (0.0)	0 (0.0)	
II	2 (1.5)	5 (1.8)	
III	3 (2.3)	8 (3.0)	
IVa	48 (36.1)	61 (22.5)	
IVb	9 (6.8)	22 (8.1)	
V (lowest)	71 (53.4)	175 (64.6)	
Number of prescribed medications	9 (6.8)	22 (8.1)	.790*
People who take drugs associated with fall risks	71 (53.4)	175 (64.6)	.410‡
Tinetti gait test	10.99 (1.49)	10.82 (2.08)	.330*
Tinetti balance test	14.47 (1.79)	14.35 (2.48)	.580*
Walk ≥210min/wk	79 (59.8)	156 (57.6)	.370‡
Do moderate weekly exercise for ≥120min	22 (16.5)	89 (32.8)	<.001†
People who fell in the previous year	44 (33.1)	82 (30.3)	.560‡
Fractures resulting from falls	1 (2.3)	7 (8.6)	.260‡
Are afraid to fall	70 (52.6)	161 (59.4)	.200‡

NOTE. Values are average ± SD or n (%). Population in the study is N=404.
*Student *t* test.
†Pearson chi-square test.
‡Fisher exact test.

or an exacerbation of any chronic condition, eg, an asthmatic onset) and chronic.

Statistical Analysis

We used a Student *t* test to compare 2 means for independent samples (quantitative data), and a Pearson chi-square test or Fisher exact test for comparison of 2 or more proportions (categorical or ordinal data). To determine the effectiveness of the intervention, we compared the percentage of falls between the IG and CG at startup and at 3, 6, and 12 months, on an intention-to-treat basis. We calculated the relative risk, relative risk reduction, and absolute risk reduction. Likewise, we conducted a survival analysis taking the time until the first fall occurs as a dependent variable, for which the Kaplan-Meier method was used. Finally, to determine the relationship between the type of applied intervention and the time passed until the fall, a Cox regression analysis was carried out through the adjustment of the prognostic and/or confounding covariates. The variables we considered as justifiably associated according to the reviewed literature were included in the maximum model.[20,33] To carry out the analysis we used SPSS, version 15.0 for Windows,[b] and MLwiN version 2.19.[c]

RESULTS

Four hundred and 4 people participated: 133 in the IG and 271 in the CG. The scheme with the study flowchart is shown in figure 1. The recruitment period was 3 months, while the follow-up was 12 months. The study began in January 2006. The basal characteristics of patients in the study are detailed in table 1. No differences were found between both groups except in the frequency of moderate physical activity, which was higher among patients in the CG. The average of associated diseases ± SD was 3±1.43 (limits, 0–8). The following conditions were the most frequently detected: cardiovascular diseases, hypertension, hypercholesterolemia, diabetes mellitus, bronchopulmonary diseases, bone or joint diseases, neurologic diseases, hearing problems, eye problems, thyroid diseases, urologic diseases, urinary incontinence, foot deformities, mental illness, and insomnia. Ninety-four patients (70.4%) from the IG attended all group sessions, 20% (n=27) missed a session, 5.6% (n=7) did not attend 2 sessions, and 4% (n=5) missed 3 or more sessions.

At the 3-month follow-up, 74.4% (n=93) of the IG subjects claimed they had increased the weekly time spent on physical activity and 91.2% (n=114) claimed they did the exercise program. At 6 months, 65.4% (n=82) of patients declared to have increased their physical activity, while 85.5% (n=106) performed the exercise program recommended. At 9 months, 79.2% (n=95) of patients reported having increased physical activity and 80.2% (n=97) performed the exercise program as recommended. Finally, at 12 months, 66.2% (n=80) claimed their physical activity level increased, and 73.6% (n=89) performed the exercise program. There was no relationship between the adherence to the program declared by patients and risk of falls.

Adaptations were recommended in the homes of 73.7% (n=95) of IG subjects and, on average, mean ± SD 7±1.64

Table 2: Results After 12-Month Follow-Up

Variables	IG (n=133)	CG (n=271)	Difference IG/CG	95% Confidence Interval	*P*
Tinetti gait test	11.10±1.51	10.38±2.58	0.72*	0.30–1.14	.001†
Tinetti balance test	14.48±1.70	13.71±2.95	0.77*	0.94–1.25	.002†
Follow the recommendations for preventing falls	94 (77.7)	112 (43.4)	2.53‡	1.79–3.60	<.001§
Walk ≥210min/wk	67 (55.8)	145 (56.4)	0.91‡	0.70–1.21	.590§
Falls at home	8 (27.5)	34 (49.3)	0.45‡	0.20–0.99	.040‖
Fractures resulting from falls	1 (0.8)	2 (0.7)	1.02‡	0.09–11.17	1.000‖
Are afraid to fall	54 (40.6)	155 (57.2)	0.73‡	0.58–0.92	.002§
Follow-up losses	12 (9.02)	13 (4.8)	1.88‡	0.88–4.00	.090§

NOTE. Values are average ± SD or n (%). For the Tinetti test, the higher the score the better functioning of gait and balance.
*Mean difference.
†Student *t* test.
‡Relative risk.
§Pearson chi-square test.
‖Fisher exact test.

Table 3: Rate of Falls (cumulative incidence) at Each Visit, by Groups, and Estimators of the Magnitude and Impact of the Intervention

Visits	IG (n=133) n (%)	CG (n=271) n (%)	*P**	RR (95% CI)	RRR (95% CI)	ARR (95% CI)
3mo	6 (4.5)	25 (9.2)	.094	0.49 (0.21 to 1.16)	51.0 (−16.3 to 79.4)	4.7 (−0.2 to 9.6)
6mo	10 (7.5)	31 (12.0)	.548	0.66 (0.33 to 1.30)	34.0 (−29.9 to 66.7)	3.9 (−1.9 to 9.8)
12mo	23 (17.3)	64 (23.6)	.146	0.73 (0.48 to 1.12)	27.0 (−12.4 to 52.3)	6.3 (−1.8 to 14.5)

NOTE. RR is a ratio. ARR and RRR are percentage values.
Abbreviations: ARR, absolute risk reduction; CI, confidence interval; RR, relative risk; RRR, relative risk reduction.
*Pearson chi-square.

problems were detected as associated with potential risk of falls at home (limits, 4–12). The following problems are highlighted: the presence of carpets at homes (15.5%, n=20) and patients walking around furniture and wires (12.4%, n=16; and 9.3%, n=12, respectively). Twenty-four (18.6%) participants had a slippery bathroom floor. After home intervention, 69.2% (n=83) of patients underwent some changes, and the problems identified were reduced significantly (P=.047; average changes/home ± SD, 3.0±1.9).

Table 2 shows the results at 12 months. Frequency of falls at the homes of IG patients was 27.5% (n=8) compared with 49.3% (n=34) of CG patients (P=.04). Thirty-one percent of subjects who took drugs associated with risk of falling during the study had falls, as opposed to 18.6% who did not take this type of medication and fell all the same (P=.007). Fear of falling was lower for the IG (40.6%) than in the CG (57.6%; P=.002). There are differences in the incidence of preintervention and postintervention falls. The rate of falls in the CG changed from 30.3% at baseline to 23.6% at the end of the study (P=.09), while in the IG the incidence of falls was 33.1% before the intervention and 17.3% at the end (P=.004). The average scores for gait and balance were similar among participants in the IG during the study period (10.9 at the beginning vs 11.1 at 12mo for the gait, and 14.4 vs 14.5 for the balance). In the CG, these variables were significantly worse in relation with baseline values (10.8 at the beginning vs 10.4 at 12mo for walking [P=.04], and 14.3 vs 13.7 for balance [P=.02]).

No significant differences were observed either at the beginning or end of the follow-up period between both groups regarding the use of medications associated with risk of falls (eg, diuretics, sedatives, hypnotics, antidepressants, neuroleptics, inhibitors angiotensin antiarrhythmics, and digoxin).

Table 3 shows the estimators of the magnitude of association and the impact of the intervention in 3 follow-up visits. Although there is a positive trend, none of the measured parameters was statistically significant. Figure 2 shows survival curves; no statistically significant differences were found (log-rank test, 2.278; P=.131). Table 4 provides the results of the Cox regression model; the variables used in the final model were sex, the existence of falls during the year before the intervention started, the presence of acute problems along the follow-up period, and participation in moderate weekly exercise for 120 minutes or more at baseline.

DISCUSSION

Our study observed a falls decrease during the 12-month follow-up, with a diverging trend between the 2 groups. Although—similar to the results of other studies published in our

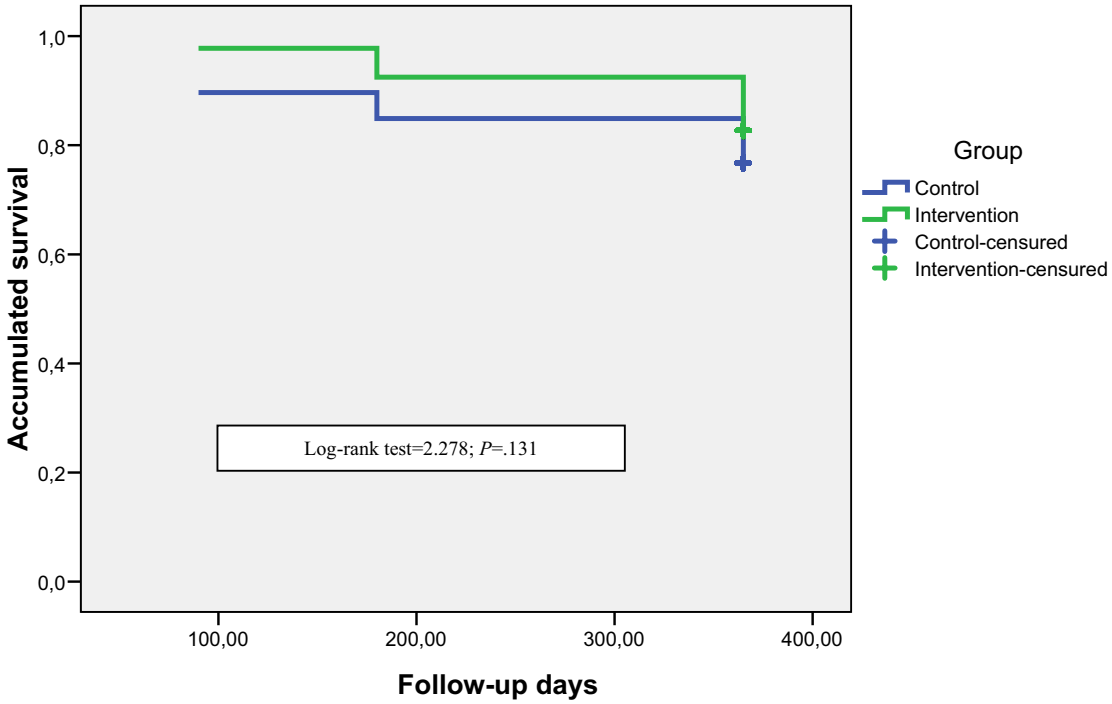

Fig 2. Survival analysis. Comparison between the 2 groups in the incidence of falls, which occurred during the 12-month follow-up.

Table 4: Analysis of the Variables Associated With Falls Through Cox Regression

Variables in the Model	b	Wald Test	*P*	OR (95% CI)
Group (IG vs CG)	−0.259	1.048	.306	0.77 (0.47–1.27)
Sex (female vs male)	0.480	4.325	.038	1.62 (1.03–2.54)
Falls in previous year	0.142	9.291	.002	1.15 (1.05–1.26)
Acute problems vs chronic problems	0.785	4.870	.027	2.19 (1.09–4.40)
Do moderate weekly exercise for ≥120min	0.649	4.986	.026	1.91 (1.08–3.38)

NOTE. N=404; omnibus test=17.249; *P*<.001. Dependent variable: time until the fall. Independent variables included: group, setting, age, sex, education, social class, marital status, falls in the previous year, fear of falling, acute problems, chronic diseases (hypertension, diabetes mellitus, hypercholesterolemia; musculoskeletal, cardiovascular, neurologic, bronchopulmonary, and urologic diseases), mental disorders, impaired vision or hearing, defects in the feet, number of drugs being taken, difficulties to walk and keep balance (Tinetti test), body mass index, and do moderate weekly exercise. Abbreviations: CI, confidence interval; OR, odds ratio.

health context[18,19]—the intervention performed did not show an overall significant improvement in the number of falls in the IG, there are 2 findings of practical relevance; namely, there were positive changes in the incidence of falls, if only statistically proven in the IG where the reduction of these nearly halved, and that after the intervention there was a significant reduction in the number of falls at the patients' homes. The program trialed in this study consists of a number of actions, with the prioritization of exercise in group and in individual levels among older people. The effectiveness of these actions to reduce falls in an older adult population has been found in subsequent systematic reviews.[13-15] As it seems, the action taken on risks at home was a major component of our intervention, because it led participants to make changes in a significant number of homes, which probably had some influence on the reduction of falls at home experienced by the IG. On the other hand, the program, by its multidisciplinary and systematic nature, fits well into the organizational structure of care usually provided at health centers in our area, where great importance is given both to the inclusion of preventive actions on populations at risk and the joint work between the physician and the nurse.

No differences were found in the incidence of falls between both groups. This finding could be explained by increasing time spent on physical activity in patients in the IG, which may have increased their exposure to falls, particularly more likely outside the home. This could explain also why the overall falls incidence was similar in both groups, except for the falls at home, which was significantly lower in the IG.

Lack of strength in the lower extremities is a frequent problem in older adults, and scarce physical activity is usually its origin. Different studies related older adult falls with weakness in the legs.[34,35] Physical activity has been proven to be effective in reducing falls.[13] Interventions based in physical exercise reduced the risk of falls in 12% and the average number of them in 19%.[36] Several publications show that physical exercise in older persons may improve some important falls risk factors, such as muscular weakness, and balance and gait problems.[37-41] Therefore, it is important to keep in mind a probable paradoxical and undesirable effect of those interventions for preventing falls that promote physical activity, which is the additional risk for falling inherent to increase this activity.[42-44]

Lack of differences in the overall decline of falls could be due more to a lack of statistical power than to the final inefficiency of the program tested. The sample size was calculated for detecting a difference of 10% (at least) in the incidence of falls among both groups at the end of the follow-up period. The difference eventually obtained was 6.3%, and therefore we conclude that there could be a statistical power problem.

In addition to its effectiveness to reduce the number of falls at home, we highlight the program's influence to improve other parameters of clinical interest. For example, an important aspect of the educational workshops was to teach a program of exercises aimed at improving flexibility, muscle strength, balance function, and gait. The results on the Tinetti test show IG patients keep their balance and gait abilities, as compared with the CG patients, which is a worthy outcome.

One of the most important aspects of falls is their social and psychological consequences, including the so-called postfall syndrome, whose flagship feature is fear of falling again. This syndrome affects the everyday life of those who suffer from it in many ways, because it was found that these people greatly restrict their physical activity and social relations, with all the negative effects it brings on.[5,6] It is, therefore, of clinical interest that the program reduced this fear among the IG subjects, probably by increasing knowledge on dealing with falls or improving self-confidence after having had one. These results are similar to the ones found in other studies.[5,19,45-47]

One other topic arising out of our work is that it provides important information when planning actions to prevent falls; especially, it identifies the population that can benefit most from these measures. Such aspects as being a women, having fallen during the previous year, and suffering from some acute health problem or worsened chronic health problem increases the risk of falls. The fact that falls are more common among women has been reported as the first statistics of falls in older adults,[48] and this difference is still present in many studies,[19,20,49] even if it disappears as the age of people increases. An element that may play a part in this is higher prevalence among older women of osteoarthritis in the hips and knees, as well as foot deformities. The coexistence of other risk factors, such as performing household chores, can bring about a higher risk for falls. Pain caused by osteoarthritis also may increase the incidence of falls by causing muscle weakness in the legs or slowing the neuromuscular response before an imminent fall.[50,51]

The present study also found that acute processes easily destabilize the functional state of older adults, making them more fragile and vulnerable to other risk factors for falls. A fall may be the initial sign of an underlying acute disorder, which would represent the onset of new diseases or the existence of an unstable disease. Some of these diseases have been also reported to be related with falls.[52,53] In analyzing the results, the use of drugs (antidepressants, neuroleptic antipsychotics, and benzodiazepines) did not show a statistical relationship with falls, unlike the results of the meta-analysis by Woolcott et al.[53] Older adults who take these types of drugs might be more sensitive to their effects and less able to metabolize them. This, associated with polypharmacy, as is often the case, can cause bad side effects and trigger falls.

Study Limitations

The present study presents some limitations that must be considered. We already mentioned the recruitment of patients was lower than was initially estimated and how this could affect the results of our study. Regarding the possible selection biases, the percentage of losses along the study duration was less than the forecasted 15%: lower than 5% in the CG and lower than 10% in the IG. A greater commitment was required

from patients from the IG, and therefore this could explain why the losses here were higher (twice). A reasonable external validity could be acquired with the diversity of centers included. Also, the characteristics of care provided to patients, as well as the conditions of the patients themselves, and their homes vary widely between the different districts of a city and between city and countryside settings. By training the researchers, we intend to minimize their subjectivity. Besides, a pilot study was conducted before starting the fieldwork.

The incidence of falls was recorded prospectively but they were only assessed every 3 months, and therefore the recall bias was a real possibility particularly in older adults. A more intensive follow-up (ie, weekly) using monthly calendars would have been more appropriate (according to the Prevention of Falls Network Europe consensus[54]). This possible bias would underestimate the incidence of falls but this is not differential, that is, it probably affects both groups equally.

Carrying out exercise by older adults can cause side effects and risks to their health. There was no damage to the subjects as a result of exercise during or after interventions.

The recommendations given to reduce the risk of falls were only taken into account in 4 out of 10 patients in the CG. This would explain why the rate of falls was reduced by only 6 points in this group and makes us think that brief counseling by the provider is insufficient. On the other hand, the fact that patients in the CG should fall more often than those from the IG could be because they were not doing the appropriate exercises, that is, exercises that do not benefit balance and lower extremity strength.

CONCLUSIONS

The multifactorial intervention program tested here does not seem significantly better than the brief intervention; however, during the year-long multifactorial intervention, the incidence of falls dropped by almost 50%, which is not the case with minimal intervention. In addition, this program gets partial or intermediate results that professionals should take into account when suggesting health advice or preventive actions to prevent falls among the older adults, such as maintaining abilities as important as balance and gait, participating in physical activity, eliminating risk factors at home, or losing the fear of falling.

It will be necessary to continue research to achieve greater consistency in the results. The few data available suggest that falls prevention strategies aimed at older people living in the community are in general cost-effective,[15] but existing information is still insufficient. It is therefore necessary to conduct studies for verifying the efficiency of these interventions.

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APPENDIX 1: INTERVENTION PROGRAM

Group Activities

-Health education session given by a nurse.
Objectives: to report on the importance of falls among older adults, their frequency and consequences, individual and environmental risk factors, and recommend individual strategies of prevention and guidelines to follow if you have a fall.

-Physical exercise workshop given by a physiotherapist.
Objectives: to do combined exercises (individualized according to combined functional capabilities of the participants) to improve flexibility and muscle strength, balance, and gait; to provide some physical activity guidelines to improve the level of aerobic conditions.

-Practice sessions. Five 90-min sessions distributed over 3wk. Objectives: to learn and practice the exercises. A manual with instructions handed out for participants to continue in their homes (recommending walking at least 30min a day and doing the exercises for 30min at least 4d/wk). Groups were between 10–16 people.

Individual Activities

-Motivational interview at the family physician's consultation. Objectives: to ensure adherence to recommendations on preventing falls and practicing the exercises, to spot clinical problems considered as fall risk factors and proceed to their treatment. Information leaflet handed out.

-Home visits (at the beginning and at month 9) by a nurse. Objectives: to assess the environmental conditions and give recommendations, where appropriate, to change them if environmental fall risk factors were found.

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Suppliers

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