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Impact of telephone coaching supporting a physical maintenance exercise programme for older adults at risk of falls: a randomised controlled trial

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Abstract

Background Encouraging compliance with recommended levels of exercise for older adults is a public health challenge. A minimal-resource solution is telephone coaching.

Objectives Primary aim: to compare timed up and go (TUG) performance 6 months after beginning a home exercise program between a group of older individuals who received additional telephone coaching, and a control group performing the home exercise program alone. Secondary aims: to compare functional and fall-related outcomes between groups at 6 and 12 months.

Methods Multicentre, assessor-blinded, randomised, controlled, open label, prospective study. Inclusion criteria included age ≥ 65 years, ≥ 1 fall in the past year, and discharged home from hospital rehabilitation or outpatient physiotherapy. All participants received a home exercise booklet and were asked to perform a set of exercises as often as possible (daily). The coaching group additionally received a monthly telephone call (total 5 calls) from their previous physiotherapist. Primary outcome was TUG performance at 6 months. Outcomes were measured at inclusion, and at 6 and 12 months. The primary outcome was analysed using a linear mixed model adjusted for the baseline value.

Results In total, 99 individuals were included (coaching group $n=50$, control group, $n=49$; mean [SD] age 83.1 [5.8] years and 77% women). TUG performance did not differ between groups at 6 months (adjusted difference 1.37, SE 1.32, 95% CI 1.26 to 4.01, $p=0.30$). Secondary outcomes did not differ between groups at 6 or 12 months except compliance to the exercise program was higher in the coaching than the control group at 6 months (adjusted difference 1.0, SE 0.5, 95% CI 0.02 to 2.0, $p=0.05$).

Conclusions The lack of difference between the groups in the time taken to complete the TUG at 6 months suggests that the monthly telephone coaching sessions did not improve the effectiveness of a home exercise programme in elderly people who had suffered at least one fall. The trial was registered on ClinicalTrials.gov (NCT02828826; 11th of July 2016, last modification 16th of September 2024).

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Keywords Older adults, Exercise, Telephone coaching, Compliance, Falls

Introduction

Falls experienced by older adults are a major public health issue. In France, over 2 million people aged >65 years fall each year [1]. A study on health behaviours reported that 19.5% of individuals aged 55 to 85 years reported limiting their movements to avoid falling again [2]. Recurrences are frequent, with a prevalence ranging from 10 to 25% depending on age, comorbidities, and institutionalization [3].

Recent recommendations state that older adults at low fall risk should aim to participate in 150–300 min per week of intermediate-intensity physical activity or 75–150 min per week of vigorous-intensity physical activity, those at a medium risk should participate in supervised programs and those at high fall risk should undergo multidomain interventions [4]. However, such programs are not yet available throughout France. In France, older adults who are hospitalised and found to have impaired balance and gait usually undergo rehabilitation. At discharge, they may be prescribed further rehabilitation. Those considered to have recovered sufficient capacity may not receive such a prescription. These individuals are at risk of losing their recent improvements if they do not strive to maintain them. Equally, individuals who partake in a period of outpatient rehabilitation to improve their balance and gait capacity may lose the benefits after discharge. Without maintenance exercises, physical performance declines after a few weeks, depending on the individuals' ages and the duration of training [5–8]. Maintaining the benefits of rehabilitation after discharge from inpatient or outpatient physiotherapy is therefore essential to prevent decline and reduce the fall risk.

Home exercises programs, such as the Otago Exercise Program [9], have been developed to improve functional capacity in older adults and reduce the fall risk. However, long-term compliance to these programs is an issue. The first study of the Otago Exercise Program found that at one year, only 42% (48 of 114) of those in the exercise group were still completing the programme ≥ 3 times a week [9]. Mean compliance to the balance and strength retraining component of another program was only 63% [10], and for another program only half of participants reported performing exercises for at least 75% of the intervention period [11]. Even compliance to supervised programs may be low. In a weekly program involving balance and strength training, mean attendance was only once every 2 weeks [12].

Encouraging compliance to the recommended levels of exercise is thus a public health challenge. One solution that uses minimal resources is telephone coaching.

Telephone coaching involves regular telephone calls by a professional to an individual at home with the aim of supporting them in their care program. Telephone coaching appears to be effective for different conditions, including compliance to a dietary plan [13], smoking cessation [14], and patient follow-up after discharge from hospitalization [15]. In the rehabilitation field, a study on the impact of telephone follow-up in people with osteoarthritis demonstrated improvements in physical performance [16].

The main aim of the study was to compare physical performance at 6 months in a group of elderly patients who had suffered a fall and had returned home receiving telephone coaching from a physiotherapist and a control group without this telephone coaching. The secondary aims were (1) to evaluate and compare between the 2 groups at 12 months the effect of telephone coaching on physical performance and (2) to evaluate and compare between the 2 groups at 6 and 12 months (a) the number of falls, (b) fear of falling, (c) autonomy, (d) lower limb performance, (e) one leg balance, (f) walking speed, (g) number of repeat hospitalisations for falls, (h) number of physiotherapy sessions and (i) the number of exercises performed per week from the program provided.

We hypothesized that monthly telephone coaching by a physiotherapist in addition to the provision of an exercise booklet would improve outcomes relative to the group that only received the exercise booklet.

Methods

Design

We conducted a multicentre, randomised, controlled, open label, prospective study between October 2016 and August 2022.

Participants were recruited among those being discharged home from hospital or being discharged from outpatient physiotherapy and living at home. Individuals who had undergone physiotherapy to improve gait and balance were potentially eligible. Participating outpatient clinics were recruited via the Primary Care Research Network of Nantes, other physiotherapy networks, at conferences and by word of mouth between physiotherapists.

The participating physiotherapist at each centre performed the inclusion and randomisation. Randomisation was centralised and performed using a secure, computer-generated, interactive, web-response system (ENNOV CLINICAL software) available at each study centre. Randomisation was stratified on study centre with a 1 : 1 ratio and performed with fixed blocks.

Participants

Inclusion criteria were people aged ≥ 65 years, ≥ 1 fall in the past year, being discharged home from hospital rehabilitation with no prescription for further physiotherapy or being discharged from outpatient physiotherapy and living at home, $\geq 24/30$ points on Mini Mental Status evaluation, able to stand up from a chair and walk ≥ 6 m with no human assistance and having provided written informed consent.

We did not include people who were under guardianship, had a progressive or degenerative pathology that could affect gait, were unable to use a telephone, had a visual impairment preventing reading of the exercise program, who refused to participate, who did not want to stop outpatient physiotherapy for the study duration, or who were included in another interventional research protocol Table 1 shows the locations where participants were included.

Intervention

Participants were asked to stop their usual physiotherapy, if they had any, during the study period.

All participants received an exercise booklet from their hospital or outpatient physiotherapist who explained the booklet to them and checked they could do all the exercises correctly and safely.

The exercise booklet had been developed previously by the first author (GR) who had been using it in his practice for 2 years. It was 24 pages long and began with information about gait and balance and the effects of aging, how to get up off the floor and what to do in case of a severe fall, recommendations in terms of footwear, and information about why exercising is important. The main part described the exercises, with illustrations for each (Additional file 2). The exercises were organised into 3 categories according to their purpose: flexibility, transfers and

strengthening, and balance and gait. To ensure safety, all the exercises were organised around a chair. Some were performed sitting in the chair and others standing holding the chair or walking around the chair. Participants were instructed to perform at least one exercise from each category as often as possible (daily) for the whole duration of the study (12 months).

More specifically, each intervention lasts about 20 min (semi-directive and motivational interview, questions about general condition, events that have occurred events since the last call, a report on the interview practice, the number of falls, a remote self-evaluation (unipodal balance, FTSST, fear of falling). 5 telephone calls were planned as part of this study, at a rate of one call per month.

Control group

Participants in the control group received no further follow-up other than the assessments at M6 and M12. Exercise booklets were given to facilitate reader comprehension.

Intervention group

Participants in the coaching group received a monthly telephone call from their hospital or outpatient physiotherapist (total of 5 telephone calls). Calls lasted approximately 20 min and included a semi-directed motivational interview, questions about general state of health, events since the last call, exercises the person had undertaken, the number of falls, a remote self-assessment of some follow-up criteria (one leg balance, FTSST and fear of falling). Using this information, the physiotherapist encouraged the person to continue to practise the exercises as regularly as possible, or to increase the number and/or frequency of exercises performed depending on the self-assessment results.

Table 1 Inclusion center

Center	In/outpatient	Coaching N=50	Control N=49	Total N=99
Hospital center Cholet	inpatient	15 (30.0%)	14 (28.6%)	29 (29.3%)
Hospital center La Rochelle	inpatient	0 (0.00%)	1 (2.0%)	1 (1.0%)
Hospital center La Roche sur Yon	inpatient	0 (0.00%)	1 (2.0%)	1 (1.0%)
Nantes	outpatient	1 (2.0%)	2 (4.1%)	3 (3.0%)
Hospital center Montaigu	inpatient	2 (4.0%)	2 (4.1%)	4 (4.0%)
Hospital center Nantes	inpatient	21 (42.0%)	20 (40.8%)	41 (41.4%)
Pontchâteau	inpatient	1 (2.0%)	0 (0.00%)	1 (1.0%)
Puy-en-Velay	outpatient	2 (4.0%)	2 (4.1%)	4 (4.0%)
Hospital center Saint-Nazaire	inpatient	5 (10.0%)	5 (10.2%)	10 (10.1%)
Saint Gervais	outpatient	3 (6.0%)	2 (4.1%)	5 (5.1%)
Outpatient inclusion		Coaching N=50	Control N=49	Total N=99
NON		44 (88.0%)	43 (87.8%)	87 (87.9%)
OUI		6 (12.0%)	6 (12.2%)	12 (12.1%)

Endpoints

The primary endpoint was the between group difference in Timed Up and Go (TUG) test performance time 6 months after discharge from the rehabilitation department.

The secondary endpoints were between group difference in:

TUG test performance time at 12 months.

At 6 and 12 months:

Number of falls.

Fear of falls rating on a VAS.

Instrumental Activities of Daily Living (IADL) score.

Five Times Sit to Stand Test (FTSST) score.

One leg balance time.

Speed on the 4 m timed walk.

Number of hospital admissions for falls.

Requirement of outpatient physiotherapy for rehabilitation.

Self-reported number of exercise sessions performed.

Assessments

The following demographic and clinical data were noted by interviewing the participant: age, sex, the presence of an informal carer at home, type of residence (home or non-medicalised residential care facility) body mass index, and mini mental state score.

Participants underwent 3 assessments: before discharge from hospital or from outpatient physiotherapy (M0), 6 months post discharge (M6) and 12 months post discharge (M12).

The assessments at M6 and M12 were carried out during a visit to the investigator site.

Assessments were performed by a trained clinical research technician who was blinded to group allocation. Data relating to hospital admission for falls and attendance of outpatient physiotherapy were sought from the individual or their general practitioner if the participant reported having consulted during the study period.

Timed up-and-go test

The TUG test measures gait capacity and balance. Participants were asked to stand up from a standard chair with armrests, to walk 3 m to a line marked on the floor, turn around, return and sit down in the chair. Participants wore their usual shoes and used their usual gait aids. Performance time was measured using a stopwatch. A practice run was allowed and then 1 trial was timed.

The TUG test is reliable and has excellent interrater agreement [17]. It has good diagnostic validity with a sensitivity and specificity of 87% for the prediction of falls [18].

Occurrence of falls

Participants were asked to record any falls on the appropriate date in their exercise log-book. A fall was defined as “the fact of finding oneself involuntarily on the ground or in a position lower than one’s starting position” [3, 19].

Fear of falling

Participants were asked to rate their fear of falling on a visual analogue scale (VAS) ranging from 0/10 “no fear of falling” to 10/10 “extreme fear of falling”.

Instrumental activities of daily living [20]

The Instrumental Activities of Daily Living (IADL) [20] assesses a patient’s level of dependence to perform activities of daily living. It consists of a scale evaluating 8 activities that the individual must be able to perform to remain at home: using the telephone, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medications, and ability to handle finances. The score ranges from 0 to 8 points.

Five times sit to stand test [21]

The FTSST test is a functional test of lower limb strength and balance. The time taken to rise as fast as possible 5 times in a row from a standard chair without pushing on the armrests is measured.

One leg balance test [22]

This test is a timed assessment of postural maintenance of static single-limb postural balance. Participants were asked to stand on the foot of their choice for as long as possible. Performance was timed using a stopwatch. Three trials were performed and the best result was used in the analysis.

Balance on one leg appears to be a significant predictor of falls with injuries (relative risk: 2.13; 95% CI: 1.04, 4.34; $P = .03$) [22].

Gait speed

The assessment of gait speed is an objective measure of the functional mobility of an older person. Gait speed was assessed over 4 m [23, 24]. Participants walked at their own, comfortable pace. Performance time was measured using a stopwatch that began when the participant initiated the first step and ended when they crossed the 4 m mark. Two trials were recorded and the fastest was used in the analysis. This test has excellent reliability [25]. A walking speed of less than 1 m/Sec. (4 s for 4 m) is an indicator of frailty [26].

Hospital admission for a fall

Any hospital admissions for a fall were collected by asking the participant or by consulting their medical records.

Outpatient physiotherapy

Any outpatient physiotherapy prescriptions to improve gait and/or balance made by the participant's general practitioner during the study period were collected by asking the participant or by consulting their medical records.

Number of exercise sessions per week

Participants were provided with a log-book in which they were asked to mark the days on which they performed a complete exercise session (at least 1 exercise from each category=3 exercises).

Training of participating physiotherapists

The first author (GR) trained all participating physiotherapists either during a ½ day onsite session or during a 2.5 h video-conference session for those who could not attend because of the distance involved. The project manager was also present to discuss the legal and financial aspects of the project. Participating physiotherapists also received a telephone coaching guide booklet (Additional file 1).

Statistical analysis**Sample size**

A descriptive pilot study of 25 individuals undergoing physiotherapy associated with follow-up telephone coaching conducted in our department (unpublished) showed that mean (SD) TUG performance time decreased (i.e., improved) from 15.1 (4.5) s to 11.8 (2.6) s at 6 months. Considering an alpha risk of 5%, a power of 80%, and an SD of 4.5s, a sample size of 162 individuals was necessary to detect a difference of 2s on the TUG between groups. Accounting for a 10% rate of missing values (withdrawal of consent, loss to follow-up etc.), a total of 180 patients were to be randomized, with 90 patients per group.

Baseline description

Descriptive analysis of all variables was performed for the whole sample and for each group, and data are presented as numbers and percentages for qualitative variables and minimum, maximum, mean, standard deviation and quartiles for quantitative variables.

Sample and missing data

Analyses were performed according to the intention to treat principle on all randomized individuals. A sensitivity analysis was also performed on the per protocol population on the primary endpoint. The Fig. 1 shows the participants excluded from the per protocol analysis.

For the primary endpoint, missing data were imputed with multiple imputation (predictive mean matching). No imputation was done on secondary endpoints.

Analysis of primary endpoint: mean TUG performance time at 6 months was compared between the 2 groups using a linear mixed model with the TUG time at D0, the group, the visit and the interaction between group and visit as fixed factors and with patients and centers as random factors. Model without centers effect was presented on appendix with goodness of fit for the 2 models (BIC).

Secondary endpoint analyses involved comparing endpoints between the 2 groups using either linear mixed models or generalized linear models with random effects. In these models, participants were considered as random effect to taking into account repeated measured at M6 and M12 and the randomisation stratification on centers. For quantitative variables, these models were adjusted for baseline values.

Results**Participants**

Ten centres (7 hospitals and 3outpatient physiotherapy clinics) participated in the study. In total, 101 individuals were included. Two consent forms were missing, therefore and 99 participants were randomly allocated to the coaching or the control group. Mean (SD) age was 83.1 (5.8) years (range 65 to 98 years) and 77% were women (Table 2).

Primary outcome (Table 3)

Change in TUG performance time did not differ between groups at M6.

Per protocol analysis was also performed for the primary outcome. The conclusion of this analysis was the same as that of the ITT analysis for the TUG time at M6, i.e., no between-group difference (difference 1.20, SE 1.40, 95% CI -1.61 to 4.01, $p=0.039$).

Secondary outcomes (Table 3)

No significant differences were found between the groups for any of the secondary outcomes except at M6 for the number of exercises performed per week which was significantly higher in the coaching than the control group, and a statistically significantly better balance at 12 months in the control group compared with the coaching group.

In total 24% of participants in the coaching group and 21% of participants in the control group reported 1 or more falls between M0 and M6; 12% of the coaching group and 20% of the control group reported 1 or more falls between M6 and M12. In total, 4% of participants in the coaching and 5% in the control group required hospitalisations before M6, and 2% in the coaching group and 5% in the control group required hospitalisations between M6 and M12. One fall occurred while performing the exercises; the 85-year-old participant sustained a femoral trochanter fracture.

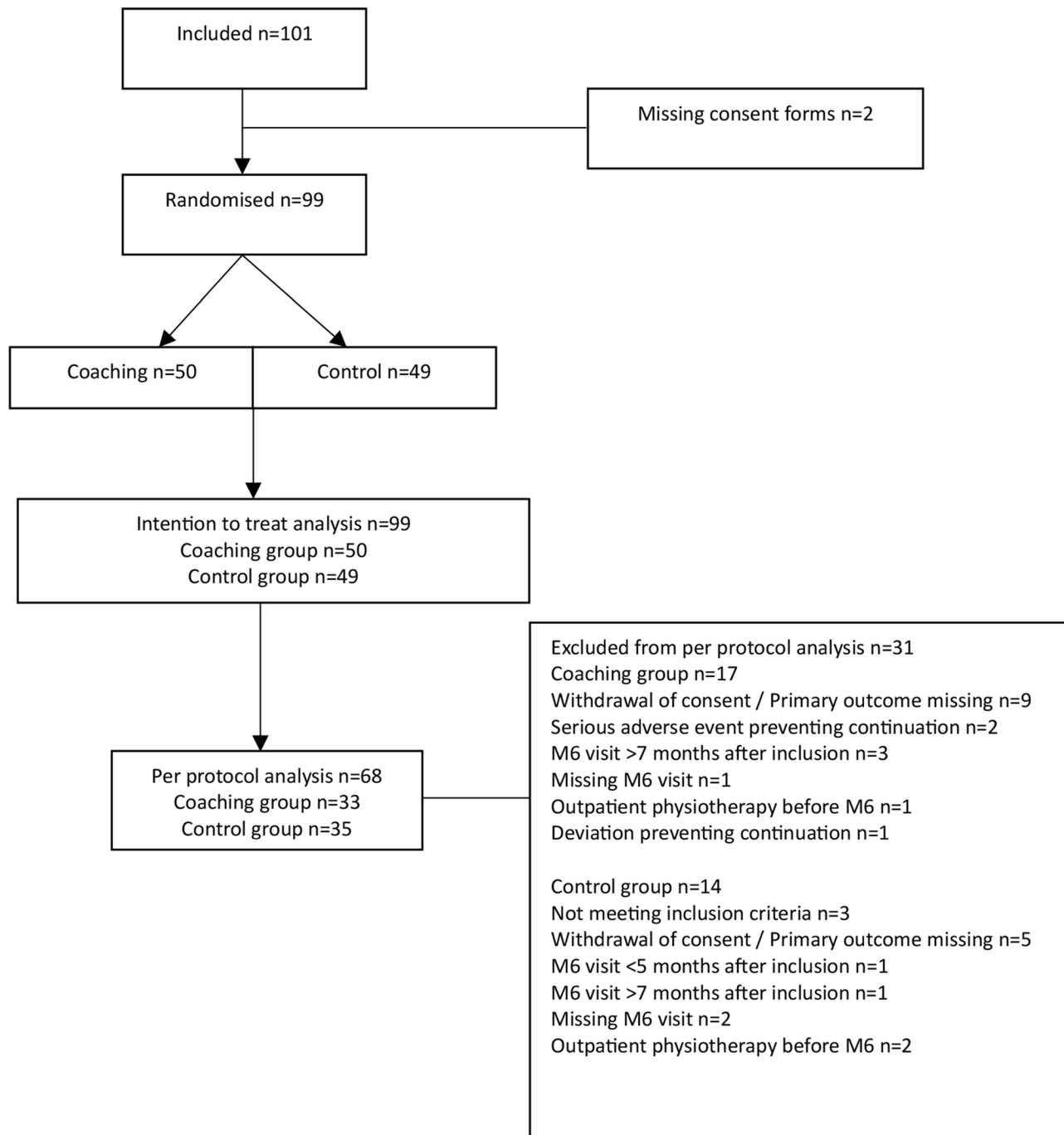


Fig. 1 Flow chart of inclusions in the intention to treat and per protocol analyses

Harms

Two serious adverse event preventing continuation occurred during the trial: one patient developed cancer preventing continuation of the protocol, and the other died of multivisceral failure.

Discussion

Summary of results

This study of the effects of telephone coaching provided to support a home exercise program on TUG performance did not find a greater effect of coaching than of the provision of a home exercise booklet alone, in contrast with our hypothesis. None of the secondary outcomes were enhanced by the coaching, except for number of exercise sessions per week, which was stronger in the

Table 2 Outcomes and results of between-group analyses at each time point

Test	Time point	Coaching n = 50	Missing data	Control n = 49	Missing data	Adjusted difference / OR	SE	95% CI	p- value
TUG (sec)	M0	14.7 (7.6)	1	14.4 (12.3)	3				
	M6	14.8 (6.4)	13	12.9 (5.0)	10	1.37	1.32	-1.26 to 4.01	0.30
	M12	14.9 (8.3)	15	13.6 (7.0)	15	1.72	1.33	—0.96 to 4.40	0.20
≥ 1 fall YES	M6	11 (23.9%)	4	9 (20.9%)	6	1.19		0.43 to 3.25	0.73
	M12	6 (12.2%)	1	9 (20.0%)	4	0.56		0.18 to 1.73	0.31
Fear of falling	M0	3.8 (2.3)	1	2.7 (2.0)	3				
	M6	3.7 (2.3)	13	3.4 (2.6)	10	-0.56	0.54	-1.64 to 0.53	0.31
	M12	3.7 (2.5)	15	3.8 (2.8)	13	-0.69	0.55	-1.80 to 0.41	0.22
IADL score	M0	6.9 (1.4)	1	7.3 (1.1)	3				
	M6	6.8 (1.4)	13	7.1 (1.3)	9	-0.09	0.27	-0.63 to 0.44	0.73
	M12	6.6 (1.8)	15	7.1 (1.5)	13	-0.28	0.28	-0.83 to 0.28	0.32
One leg balance time (sec)	M0	7.9 (10.8)	2	7.4 (7.5)	3				
	M6	7.9 (10.9)	16	9.0 (7.2)	11	-1.31	2.44	-6.21 to 3.58	0.59
	M12	7.6 (11.2)	18	12.5 (16.7)	16	-5.72	2.56	-10.85 to -0.60	0.03
Five Times Sit To Stand time* (sec)	M0	16.2 (10.0)	11	13.7 (5.6)	7				
	M6	15.3 (4.2)	20	15.0 (5.3)	12	-0.17	1.16	-2.51 to 2.16	0.88
	M12	16.9 (5.8)	19	14.4 (4.2)	16	1.87	1.20	-0.54 to 4.28	0.13
Gait speed (m/s)	M0	1.4 (0.7)	1	1.2 (0.3)	3				
	M6	1.5 (0.9)	13	1.3 (0.6)	10	0.08	0.14	-0.20 to 0.36	0.56
	M12	1.5 (0.7)	15	1.3 (0.6)	15	0.04	0.15	-0.25 to 0.33	0.80
≥ 1 admission for fall YES	M6	2 (4.3%)	4	2 (4.9%)	8	0.89		0.11 to 6.95	0.91
	M12	1 (2.2%)	4	2 (4.9%)	8	0.43		0.04 to 5.29	0.51
Need for outpatient physio YES	M6	9 (23.1%)	11	11 (27.5%)	9	0.79		0.28 to 2.26	0.66
	M12	11 (31.4%)	15	14 (38.9%)	13	0.72		0.26 to 1.98	0.52
N ^o . exercises performed per week	M6	3.8 (2.1)	13	2.7 (2.0)	9	1.0	0.5	0.02 to 2.0	0.05
	M12	2.5 (2.3)	16	2.5 (2.4)	14	-0.01	0.5	-1.1 to 1.0	0.99

Data are mean (Standard Deviation) or n (%)

* Some participants used the armrests to stand during the FTSST

** Adjusted difference for quantitative variable / Odd Ratio (OR) for qualitative variable

For quantitative variables, data are difference and SE (linear mixed model, adjusted on baseline value and with center as random effect), for qualitative variables, data are OR (generalised linear mixed models with center as random factor)

Table 3 Participant demographics

		COACHING N = 50	CONTROL N = 49	Total N = 99
Age (year)	Missing	1	2	3*
	Mean (SD)	82.8 (6.9)	83.4 (4.4)	83.1 (5.8)
Sex	Missing	1	2	3
	Male	13 (26.5%)	9 (19.1%)	22 (22.9%)
	Female	36 (73.5%)	38 (80.9%)	74 (77.1%)
Informal carer at home	Missing	1	2	3
	Yes	18 (36.7%)	12 (25.5%)	30 (31.3%)
Type of residence	Missing	1	2	3
	Home	47 (95.9%)	46 (97.9%)	93 (96.9%)
	Residential care	2 (4.1%)	1 (2.1%)	3 (3.1%)
Body mass index (Kg /m ²)	Missing	1	2	3
	Mean (SD)	24.8 (3.8)	25.1 (4.1)	25.0 (3.9)
Mini mental state score	Missing	1	2	3
	Mean (SD)	27.5 (1.9)	27.0 (1.7)	27.3 (1.8)

* These 3 participants withdrew consent and opposed the use of their data

group that received the coaching than the group that did not.

Lack of an effect of telephone coaching on outcomes

Few studies have specifically evaluated the additional benefits of telephone coaching supporting a home exercise program in older adults experiencing falls. One study evaluated the impact of telephone coaching in addition to a home exercise program for people with knee osteoarthritis. Both groups received 5×30 min sessions of face-to-face physiotherapy over 6 months and participants in the coaching group additionally received 6–12 telephone coaching sessions during the same period. However, similarly to our study, functional outcomes did not differ between groups [27], although both groups in that study improved. In both that study and the present study, the lack of a between-group difference in any of the functional outcomes occurred despite greater compliance to the exercise program by the coaching group – 14% more over 6 months in Bennel et al.'s study and an extra session per week in our study. A study of people discharged home after a stroke who received either standard care (including rehabilitation) or standard care with an additional individualised coaching program involving exercise and activity, which was considerably more intense than the home exercise and telephone coaching proposed in the present study, also found no impact of coaching on functional outcomes, despite a reasonable level of compliance [28]. Although these studies were performed in people with dissimilar pathologies and using diverse types of outcome measures, these results suggest that substantial differences in compliance may be necessary to alter functional outcomes. Further studies should address the question of how to induce such a substantial difference using telephone coaching.

Effect of coaching on number of exercise sessions per week

Although the coaching did not improve any performance related outcomes relative to the control group in the present study, it did improve compliance to the exercise program. The coaching group performed on average 1 more exercise session per week (3.8 sessions) than the control group (2.7 sessions) during the first 6 months post discharge. Once the coaching was stopped, the weekly number of sessions reduced by around 1 session in the coaching group, further supporting the beneficial effect of the coaching on compliance. According to the literature, telephone coaching facilitates behaviour change [16] and improves compliance to home exercise programs. However, this effect is stronger if there is some face-to-face contact with the telephone coach as this facilitates relationship building [29, 30]. In the present study, the telephone coach was the participant's previous

physiotherapist, therefore a relationship had already been established.

Between 6 and 12 months, both groups performed a similar weekly number of sessions (2.5 sessions). The relatively good compliance of the control group could explain the lack of difference in outcomes between the groups, a between-group difference of only 1 session per week during the first 6 months of the study may have been insufficient to induce a difference in the performance outcomes.

The relatively good compliance of the control group over the year of follow-up may have been motivated by the knowledge of their participation in a research protocol and the fact they knew they were to undergo follow-up assessments for the study at 6 and 12 months. Another explanation may be that the simplicity of the program (only 4 exercises per day) promoted compliance, facilitating integration of the program into the participants' lifestyles. In a study involving a more intensive exercise program, only around 20% of participants performed the recommended 3 sessions per week [31].

Lack of a functional decline in both groups

The purpose of the home exercise program was to maintain the effects of the in- or outpatient physiotherapy programs the participants had previously undertaken. Decline in performance is common, both with natural aging and after cessation of an exercise program. Many studies have shown a decline in strength, gait and balance performance in older, non-falling adults after cessation of exercise program [5–8]. Although we did not analyse within-group changes, the changes that occurred in TUG performance time were likely smaller than the minimum clinically important difference (MCID) [32, 33]. The MCID for the TUG test varies from around 1.6s to 15s according to the method used to determine its value and the pathology studied [32–34]. Since performance time did not increase by more than 1.6s in either group, we consider that no decline occurred. Therefore, the lack of decline in both groups after discharge from in- or outpatient physiotherapy suggests that the benefits of the rehabilitation were maintained. This is particularly important since decline after cessation of training occurs more quickly in older-older adults (aged 74–86 years, similar to those in the present study) than in younger-older adults (aged 60–73 years) [7]. Furthermore, the participants in the present study were fallers, unlike those included in other studies of decline [5–8], decline could therefore be expected to be more rapid in the present study, which was not the case.

Other studies have shown improvements with home exercise programs. One example is the Otago exercise program [35]. This program involves a more intensive home exercise program than the one tested here. It

includes performing a range of exercises at home at least 3 times per week, supported by therapist home visits and telephone calls. It has been found to improve functional performance, strength and reduction fall risk, although this effect may depend on the sample [31]. In the present study, TUG performance did not improve, however it appears to have been maintained, which was the intended purpose of the program since it was provided after a bout of in- or out-patient rehabilitation. This finding suggests that performing a low-grade exercise program twice per week may be sufficient to maintain performance levels after discharge from a rehabilitation program. This result needs to be confirmed by studies specifically dedicated to this hypothesis.

Strengths and limitations

This study is among the first to evaluate the effectiveness of telephone coaching supporting a home exercise program in older adults who fall. The coaching was provided for 6 months and the follow-up lasted 12 months, providing a long-term assessment of the outcomes.

The main limitations of the study were the relatively large amount of missing data and the fact the planned sample size was not reached. The lack of motivation of some staff in one of the centres resulted in a surprising, large number of consent withdrawals (Fig. 1). This was because the Covid 19 pandemic complicated recruitment. Furthermore, changes in hospital discharge policy occurred during the time of the study, meaning that patients were discharged from hospital at lower functional levels and with a prescription for follow-up outpatient physiotherapy, an exclusion criterion for study participation.

The coaching was provided once per month to ensure the feasibility of the study; however, we believe that once per week coaching would be more appropriate and more effective.

Conclusions

Although the participants in the coaching group performed significantly more exercises than those in the control group during the first 6 months of the study, there was no between-group difference in TUG performance time at 6 months suggesting that monthly telephone coaching sessions did not enhance the effectiveness of a home exercise program in older adults who had sustained at least 1 fall. The exercise program was relatively simple and was performed only 2 to 3 times per week, however TUG performance did not appear to decline in either group over the 12-month follow-up. Future studies should investigate the intensity and content of telephone coaching programs necessary to enhance functional and fall-related outcomes in older adults.

Abbreviations

FTSST	Five Times Sit to Stand Test
IADL	Instrumental Activities of Daily Living
IANA	International Academy on Nutrition and Aging
MCID	Minimum clinically important difference
TUG	Timed up and go
VAS	Visual analogue scale

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12877-024-05488-y>.

Supplementary Material 1: Appendix 1 CONSORT checklist

Supplementary Material 2: Appendix 2 Coaching guide booklet

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Author contributions

conception or design of the work; GR, JF, CV, CCC. The acquisition, analysis, or interpretation of data; GR, JF, CV, TR. The creation of new software used in the work; none. Have drafted the work or substantively revised it GR, JF, CV, CCC, TR.

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Data availability

Data relating to this study are available on reasoned request from the paramedical care research coordination unit at Nantes University Hospital: RECHERCHE-PARAMEDICALE@chu-nantes.fr.

Declarations

Ethics approval and consent to participate

The trial was granted ethical approval by the ethics committee "Comité de protection des personnes Ouest IV", reports to French health ministry, 3rd of May, 2016, ref 22/16 and all participants provided written informed consent for participation. The trial was registered on www.ClinicalTrials.gov (NCT02828826; 11th of July 2016, last modification 16th of September 2024). The study is reported according to the CONSORT guidelines (Appendix 1).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Conflict of interest

We have no Conflict of Interest.

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