

RESEARCH ARTICLE

Effectiveness of an Occupational Therapy Home Programme in Spain for People Affected by Stroke

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Abstract

The main aim of this paper is to assess the effects of an occupational therapy home programme in Spain on 23 people who had had stroke (mean age 61.17 years). The programme was made up of a set of activities and techniques of physical, cognitive, social and functional nature aimed at preventing, maintaining and/or rehabilitating the abilities affected of people who had had stroke. A multiple-baseline intrasubject design and replication with a treatment withdrawal period to check whether the effects of the programme remained was applied.

The results show a significant statistical improvement, concerning not only the participants' cognitive skills through Loewenstein Occupational Therapy Cognitive Assessment Battery – Second Edition but also their functional independence as assessed by the Barthel Index.

Despite the low number of participants, being one of the limitations of our study, the results support the need to carry out research about the effectiveness of rehabilitation treatments in the home with the goal to plan how public healthcare systems should tackle them and how to improve those already being used. Copyright © 2014 John Wiley & Sons, Ltd.

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Keywords

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Introduction

In Spain, stroke is the leading cause of death amongst women and number 3 amongst men (Fuentes et al., 2012). Specialists recommend starting rehabilitation as soon as medical conditions become stable. In this respect, rehabilitation by means of occupational therapy (OT) programmes is aimed at improving the participation

of the person who has had stroke in significant functions, activities and tasks (Rowland et al., 2008).

Occupational therapy treatments include tasks and activities chosen for and adapted to each stroke patient. They generally include motor, sensorial, visual and perceptual training as well as cognitive skills in the context of functional skills in order to minimize secondary complications and provide information and support

to patients and caregivers (Teasell and Kalra, 2005; Rowland *et al.*, 2008; Woodson, 2008).

Reviewing the use of OT for people who had had stroke, Legg *et al.* (2007) found that those cases in which an OT programme focusing on daily life activities (DLA) was applied was more likely to help make patients independent concerning such activities in comparison with those where no OT treatment had been given.

Numerous studies carried out over the years have clearly shown the effectiveness of OT programmes in several areas of action: healthcare, social and community areas and education. Most of these studies are set in healthcare and social contexts, and somewhat fewer take place in the educational field, whereas very few occur in the community scope, which is where OT in the home is included (American Occupational Therapy Association, 2008). In order to establish if that is also true in connection with stroke rehabilitation, a bibliographic review of studies undertaken between 1998 and 2012 was performed in the following databases: PsycINFO, MEDLINE, Embase, AMED, OTseeker, CSIC, Dialnet and TESEO. The search terms used were occupational therapy, stroke, rehabilitation and treatment in the home. The review performed was not limited to any country or location, and the results did not show that OT in the home is specific to any geographic area. This review clearly showed that the studies focusing on the role of OT programmes in the rehabilitation of stroke patients are rather scarce, most of them undertaken in the field of healthcare. On the other hand, we also noticed that OT home (OTH) programmes have been applied after a stroke incident since the year 2000.

In this regard, Gilbertson *et al.* (2000) carried out one of the earliest studies in this field with the objective to establish a programme for users having been discharged from hospital. A 6-week OT intervention was applied to the 138 subjects participating in the study. The assessment instruments used were the Barthel Index (Mahoney and Barthel, 1965) – to examine the DLA – and a satisfaction questionnaire about how satisfied the users were with having access to these services in the home. The authors report about significant post-intervention functionality improvements and about a greater degree of satisfaction amongst users who said that they felt more confident and had more knowledge about their condition as a result of preparing the return home program, in addition to feeling safer in being treated in their own environment.

Previous findings are highly similar to the ones reached in subsequent studies. In these studies, aspects such as the importance of treating the patient at home (Anderson *et al.*, 2000; Legg and Langhorne, 2004; Rowland *et al.*, 2008), the positive impact on the patient and his family and experiencing (Parker *et al.*, 2001; Lincoln *et al.*, 2004) less pain and a greater degree of functional ability doing everyday tasks are highlighted (Alexander *et al.*, 2001; Hoffmann *et al.*, 2008; Legg *et al.*, 2008). The aforementioned studies, along with others carried out in the field of stroke and where the Loewenstein Occupational Therapy Cognitive Assessment Battery – Second Edition (LOTCA-II; Itzkovich *et al.*, 2000) and the Barthel Index were used as tools to assess the improvements obtained from the treatment, served as the basis for the present work.

The purpose of this research study was to assess the efficacy of an OTH programme in a group of people who had had stroke. The premise we started from was that a treatment in the home would favour rehabilitation, as the people who had had stroke would maintain their functions, habits and skills in their usual environment as much as possible. For this purpose, two main objectives were set: (1) to check if the cognitive and perceptive skills of people who had had stroke improved after implementing an OTH programme and (2) to assess possible improvements in the ability to carry out basic DLA after applying the treatment.

Method

Participants

The sample for our study was made up of 23 people who had had stroke. The sample was obtained with the cooperation of several neurologists and rehabilitators working in public and private hospitals in the Spanish autonomous region of Galicia, in north-western Spain.

Before selecting the sample, we spoke to the aforementioned doctors and explained the goals and conditions of our study, and it was the doctors themselves who invited the users to take part in it, giving them the informed consent document and collecting the document once signed. The following inclusion criteria were established:

- (1) adults of both genders up to 70 years of age;
- (2) at least 1 year from diagnosis of stroke;

- (3) living in one's usual home;
- (4) not having received specifically OT within their rehabilitation program; and
- (5) being in a physical and mental condition to understand and follow the assessment and treatment instructions and procedures.

In order to make the sample as homogeneous as possible, the following exclusion criteria were used:

- (1) unable to respond to the assessment tests because of aphasia;
- (2) having a terminal illness or disorder prior to stroke, which may affect cognitive functions (head injury, psychosis, intellectual disability, etc.);
- (3) visual impairment;
- (4) having a background of alcohol or drug abuse; and
- (5) rejecting participation in the research study.

The mean age of the 23 subjects was 61.17 years, ranging from 51 to 68 years. Ten were men and 13 were women. Of the total sample, nearly half of the participants (11) were married, five were widows/widowers, four were divorcees and three were single. As regards their educational background, five of them had basic studies, 15 had intermediate studies and three had higher education. They all had family support. Table I shows the demographic features of the sample.

Instruments

The two instruments used in this study are described subsequently. The LOTCA-II (Itzkovich et al., 2000) is

very commonly used as a cognitive assessment tool by occupational therapists around the world. It is a valid test for determining the degree of cognitive and perceptive skills amongst people affected by brain disorder, and it is used for neurological rehabilitation protocols.

Although there are as many as four LOTCA versions, we selected the second edition for this study, because it is designed to be applied to subjects up to 69 years of age featuring some type of cognitive or perceptive disorder. It allowed us to assess a total of seven factors: orientation, visual perception, spatial perception, motor apraxia, hand-eye coordination, rational operations, attention and concentration. Wherefore, it includes 27 subtests. Most of the subtests score on a scale of 1 to 4, with the exception of those dealing with *place and time orientation*, which score on a scale from 1 to 8 points, and three of the *rational operations* factor, which score on a scale of 1 to 5.

Once the authors granted their permission, the scale was translated into Spanish in order to be able to apply it to the participants in our study. Two native speakers trained in OT translated the instrument from English to Spanish and Spanish to English to ensure that the meaning was kept.

The Barthel Index (Mahoney and Barthel, 1965) was used to assess the DLA. This is an assessment instrument normally used for people affected by a neurological pathology, which assesses the subjects' functional ability (independence or dependence) to perform some basic everyday activities. Applying it is quick and easy, and it allows us to determine the deterioration degree of subjects as well as facilitate the design of interdisciplinary care, therapy and rehabilitation plans.

It also enables us to assess a person's functional state by taking 10 basic DLA into account: feeding, bathing, dressing, grooming, bowels, bladder, toilet use, transfers (bed to chair and back), mobility (on level surfaces) and going up and down the stairs. These activities are assessed and rated on a scale from 1 to 10, with the exception of two cases, namely, moving to one's armchair/bed and strolling and getting about, which go from 0 to 15; 0 point means being very dependent, 5 points means needing help and 10 points means being independent. The 0 to 15 point scale shows whether little or much help is needed by the subjects. The highest possible score is 100, which would mean that the person is independent in terms of personal care and their ability to carry out basic

Table I. Demographic features of the sample

	Frequency	%
Gender		
Male	10	43.5
Female	13	56.5
Marital status		
Single	3	13
Married	11	47.8
Widow/er	5	21.7
Separated or divorced	4	17.4
Education		
Basic	5	21.7
Intermediate	15	65.2
Higher	3	13.4

everyday activities; a score <60 would indicate a light degree of dependence; between 40 and 55 points would mean a moderate level of dependence; between 20 and 35 would be severe dependence; whilst >20 would show a total degree of dependence.

Design

A multiple-baseline intrasubject design and replication with a treatment withdrawal period to check whether the treatment effects remained was used. The LOTCA-II was used whenever an assessment was made, that is, before implementing the OTH treatment (checkpoint 1 – CP1), before the treatment withdrawal period (CP2), when the treatment withdrawal period is over (CP3) and when the treatment is over (CP4).

Further, the Barthel Index was only employed twice: before applying the OTH treatment (CP1) and after it is over (CP4). The DLA were maintained during the withdrawal phase for ethical reasons, leaving its supervision under the control of the family environment. Therefore, further assessments with the Barthel Index in CP2 and CP3 were not conducted.

Thus, a non-parametric analysis was used.

Procedure

First, an initial assessment was performed with each of the participants during two 1-hour sessions. In the first session, an initial interview was held with the patient and their family where data about the patient's degree of independence in the different fields of occupational performance were gathered, taking the OT work framework into account, that is, basic and instrumental DLA, work, education, leisure and social participation (American Occupational Therapy Association, 2008). This interview was carried out in the home of each patient to collect data about the patient's own home and environment; furthermore, the objectives and the duration of the study and the fact that it was voluntary were explained to them.

Once the patients had been interviewed, a date was set for the second assessment with the aim to apply the LOTCA-II and the Barthel Index.

After completing the initial assessment, the OTH programme was carried out on an individual basis with each of the users for 6.5 months. The time was

distributed as follows: 3 months for the treatment, 1.5 months for the treatment withdrawal and two more months for the treatment after the withdrawal period was over.

Table II shows both the design and the process schematically.

Treatment sessions were individual, twice a week, lasting for approximately half an hour and alternating with breaks when necessary. The sessions were set up and scheduled in accordance with each subject's specific needs, although, generally speaking, the time in this type of session was distributed in the following way:

- from 5 to 10 minutes of space–time orientation;
- about 35 minutes working on each session's main goal;
- about 30 minutes for DLA;
- approximately 5 minutes to relax; and
- from 10 to 15 minutes counselling the family or the main caregiver.

Therefore, approximately 65 minutes was intended to the application of the techniques that comprise the OTH programme (35 minutes was reserved for the main purpose of the session and 30 minutes to work with DLA).

Table II. Summary of design and procedural phases

Phase	Tasks and duration
First assessment (checkpoint 1)	Applying LOTCA-II Applying Barthel Index
OT treatment	During 3 months (12 weeks) Two sessions per week, on interspersed days (24 sessions) 1-hour and 30-minute sessions
Second assessment (checkpoint 2)	Carried out at the end of the first phase of treatment Applying LOTCA-II
Treatment withdrawal period	During 1.5 months
Third assessment (checkpoint 3)	Carried out at the end of withdrawal period Applying LOTCA-II
OT treatment	During 2 months (8 weeks) Two sessions per week, on interspersed days (16 sessions) 1-hour and 30-minute sessions
Fourth assessment (checkpoint 4)	Carried out at the end of the second phase of treatment Applying LOTCA-II Applying Barthel Index

LOTCA-II = Loewenstein Occupational Therapy Cognitive Assessment Battery – Second Edition; OT = occupational therapy.

The OTH programme was made up of a set of activities and techniques of physical, cognitive, social and functional nature aimed at preventing, maintaining and/or rehabilitating the abilities affected of people who had had stroke. The techniques employed and adapted on a case-by-case basis were as follows:

- (1) training, re-educating, adapting and establishing basic and instrumental daily life habits;
- (2) assessment, adapting the environment, accessibility and technical aid;
- (3) implementing splints or orthoses;
- (4) family counselling;
- (5) cognitive and sensorial stimulation;

- (6) psychomotor skills;
- (7) functional body posture training for everyday activities;
- (8) using and adapting Information and Communication Technology;
- (9) occupational workshops on activities significant for each person;
- (10) studying and adapting to each person's job; and
- (11) planning leisure activities significant for each person.

The LOTCA-II was applied throughout the treatment period and when beginning and ending the treatment withdrawal period, as well as at the end of OTH programme (i.e. on three occasions). The goal of applying it at different times was aimed at checking

Table III. Evolution of median values in the seven factors evaluated by LOTCA-II along the four assessment times

Variables LOTCA-II	Mdn CP1	Mdn CP2	Mdn CP3	Mdn CP4
Orientation				
1. Place (OL)	6	7	8	8
2. Time (OT)	6	7	7	8
Visual perception				
3. Visual object identification (IO)	3	3	3	4
4. Visual shape identification (IF)	2	3	3	4
5. Overlapping figures (FS)	2	3	3	4
6. Object constancy (CO)	2	3	3	3
Spatial perception				
7. Identifying one's own body parts (PE1)	2	3	3	4
8. Spatial relationship (PE2)	2	3	3	3
9. Spatial relationship on a drawing (PE3)	2	3	3	3
Motor practice				
10. Motor imitation (P1)	2	3	3	4
11. Use of objects (P2)	2	3	3	4
12. Symbolic actions (P3)	2	3	3	3
Hand-eye organization				
13. Copying geometrical shapes (FG)	2	3	3	3
14. Two-dimensional model (MD)	2	3	3	3
15. Board with holes in it	2	3	3	3
16. Designing with colour blocks	2	3	3	3
17. Designing with wooden colour blocks	2	3	3	3
18. Assembling a jigsaw puzzle	2	3	3	4
19. Drawing a clock	2	3	3	4
Rational operations				
20. Categorising	2	3	3	4
21. Unstructured Riska Object Classification	2	3	3	4
22. Structured Riska Object Classification	2	3	3	4
23. Pictorial sequence A	2	3	3	4
24. Pictorial sequence B		Not enough cases to process		
25. Geometrical sequence	2	3	3	3
26. Logical questions	2	3	3	4
Attention and concentration				
	3	4	4	4

LOTCA-II = Loewenstein Occupational Therapy Cognitive Assessment Battery – Second Edition; Mdn = median.

how the subjects' cognitive functions evolved. The Barthel Index was applied after the occupational home therapy had ended.

Results

To begin with, by calculating the median (Mdn), we were able to check whether any changes had occurred in the scores of each of the variables assessed by means of the LOTCA-II from the initial assessment prior (CP1) to the intervention to the assessment performed at the end of the OTH treatment (CP4), as well as at the end of the first phase of treatment (CP2) and at the end of the withdrawal phase (CP3). The results may be seen in Table III.

As can be seen in Table III, a positive evolution takes place in all the factors assessed by means of the LOTCA-II from CP1 (pre-treatment assessment) to CP4 (the end of the treatment). By means of the χ^2 -test, we were able to establish that the score improvements in each of the LOTCA-II variables were statistically significant when comparing CP1 and CP4 (Table IV). Statistically significant differences between CP2 and CP3 (before and after the treatment withdrawal period) were not found.

Concerning the participants' progress with regard to their degree of independence measured by means of the Barthel Index, we have verified that the independence percentage improves as the treatment advances. Using the Wilcoxon signed test, it was possible to confirm that such improvements were statistically significant in nine out of 10 DLA assessed by means of the Barthel Index. Only one of the activities (bowels) did not show any differences after applying the OTH treatment.

Table V reflects the independence degree percentage results obtained for each of the different everyday life activities, as well as the ones obtained through the signed test from CP1 (pre-treatment assessment) to CP4 (end of the treatment). As has already been mentioned earlier, these were the only two measurements taken with the Barthel Index.

In terms of the total score of the Barthel Index, the median increases considerably, going from Mdn = 50 in the assessment prior to the OTH treatment to Mdn = 85 when the treatment ended. Therefore, we can clearly state that the difference between the scores registered at the first and last checkpoints is statistically significant ($Z = -4.23$; $p < 0.01$).

Table IV. Changes in the scores obtained using LOTCA-II from the pre-treatment assessment to the end of the treatment

Variables	Evolution from checkpoints 1 to 4	
	Mdn	χ^2
Orientation		
1. Place (OL)	6–8	48.22**
2. Time (OT)	6–8	43.82**
Visual perception		
3. Visual object identification (IO)	3–4	45.38**
4. Visual shape identification (IF)	2–4	40.22**
5. Overlapping figures (FS)	2–4	50.52**
6. Object constancy (CO)	2–3	39.04**
Spatial perception		
7. Identifying one's own body parts (PE1)	2–4	47.06**
8. Spatial relationship (PE2)	2–3	44.33**
9. Spatial relationship on a drawing (PE3)	2–3	42.78**
Motor practice		
10. Motor imitation (P1)	2–4	44.39**
11. Use of objects (P2)	2–4	46.47**
12. Symbolic actions (P3)	2–3	44.62**
Hand-eye organization		
13. Copying geometrical shapes (FG)	2–3	46.08**
14. Two-dimensional model (MD)	2–3	52.07**
15. Board with holes in it	2–3	46.87**
16. Designing with colour blocks	2–3	48.43**
17. Designing with wooden colour blocks	2–3	49.39**
Rational operations		
18. Assembling a jigsaw puzzle	2–4	52.41**
19. Drawing a clock	2–4	45.40**
20. Categorising	2–4	51.26**
21. Unstructured ROC	2–4	51.38**
22. Structured ROC	2–4	52.20**
23. Pictorial sequence A	2–4	49.50**
24. Pictorial sequence B	Not enough cases to process	
25. Geometrical sequence	2–3	51.83**
26. Logical questions	2–4	46.16**
Attention and concentration	3–4	31.95**

Mdn = median.

** $p < 0.01$.

The development of the degree of independence carrying out all of these different DLA is shown in a graph in Figure 1. As the treatment advances, the percentage of independence becomes significantly better in all of the variables except for number 5 (bowels), in which there are no significant differences between the two checkpoints.

Finally, at the end of the treatment, patients and relatives were asked to indicate their satisfaction with the OTH programme on a scale of 1 to 10. The results showed that the degree of satisfaction of people with

Table V. Changes in the scores obtained using the Barthel Index from the pre-treatment assessment to the end of the treatment

Daily life activities	Evolution from checkpoints 1 to 2		Effect size
	Independence %	Z	
1. Feeding	0–52.2	−3.87**	0.81
2. Bathing	8.7–65.2	−2.83**	0.59
3. Dressing	0–78.3	−4.25**	0.89
4. Grooming	13–100	−4.47**	0.93
5. Bowels	78.2–91.3	−1.73	0.36
6. Bladder	47.8–73.9	−2.12*	0.44
7. Toilet use	13–78.3	−4.24**	0.89
8. Transfers	8.7–82.6	−4.47**	0.93
9. Mobility	17.4–69.6	−4.01*	0.85
10. Stairs	4.3–34.8	−3.16**	0.66
Total score	Mdn 50–85	Z −4.23**	Effect size 0.88

Mdn = median.

**p* < 0.05.

***p* < 0.01.

stroke ranged from 9 (three cases) to 10 (20 cases). For their part, the degree of satisfaction of the family was the maximum in all cases (23 cases).

Discussion and conclusions

The data gathered from this study show that progress and benefits are achieved regarding cognitive abilities (orientation, visual perception, spatial perception, psychomotor skills, visual motor organization, rational operations, attention and concentration) for all the participants after implementing an OTH programme.

These results are partially in accordance with those obtained by other studies in which there have been a similar number of participants affected by stroke and in which the LOTCA-II has likewise been employed (Katz et al., 1989; Cermak et al., 1995; Katz et al., 2000; Su et al., 2007). Nevertheless, if we compare this study with the other four mentioned earlier on in this paper, there are some differences between them, not only in terms of how long the occupational treatment lasted but also concerning where it was applied.

In this regard, it is worth highlighting that Cermak *et al.* (1995) applied the LOTCA to 75 people from different countries who were in hospital after having a stroke, on one single occasion, with the aim of finding the differences between them. In the Katz *et al.* study from 1989, the LOTCA was applied before applying an OT treatment. It was conducted in a hospital environment, though, comprising 20 stroke patients, 28 with head injuries, and there was a control group without any neurological affectation at all. The same authors performed a later study with 40 stroke patients where they made three assessments (before the OT treatment and when it was over and after a 6-month follow-up period). The results showed a lower degree of functional performance amongst the unilateral neglect patients (Katz et al., 2000). Only the study by Su *et al.* (2007) is similar to the research work put forth in this paper, as far as intervening in the home environment is concerned, but one assessment was made of patients affected by stroke and other neurological pathologies by means of the Chinese LOTCA-II version, which had been translated into Taiwanese.

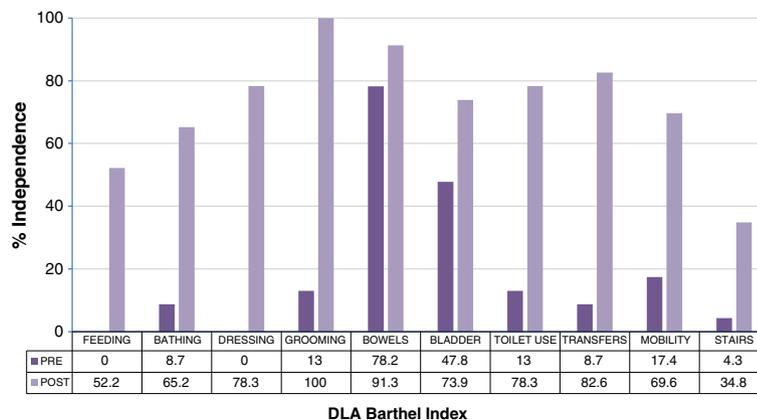


Figure 1. Changes in the percentage of independence measured by means of the Barthel Index from the assessment prior to the occupational home therapy treatment to the end of the treatment

As for the DLA results obtained by measuring with the Barthel Index, they show how the percentage of independence significantly improves in eight of those 10 activities as the treatment advances. An improvement therefore occurs at a functional level in the stroke-patient group submitted to an OTH treatment.

These results agree with the ones obtained by Duncan *et al.* (1998). These researchers applied an OTH to a similar number of users with a stroke diagnosis ($N = 20$). The intervention carried out at the functional level went on for 12 sessions, and it was assessed by means of the Barthel Index. The authors pointed out the need to apply different types of intervention programmes in accordance with the subjects' functional state. This particular aspect was taken into account in our study, where we have endeavoured to design and apply *an individualized programme in accordance with each person's characteristics*.

In keeping with this, other studies obtained similar results, which strengthen the theory that the users who receive an OT treatment show a higher degree of independence in their everyday life activities. Moreover, they highlight the importance of the effects of the OT in the home and in the community, because of not only the benefits for the stroke patients themselves but also those enjoyed by their families and their close environment (Anderson *et al.*, 2000; Gilbertson and Langhorne, 2000; Gilbertson *et al.*, 2000; Alexander *et al.*, 2001; Parker *et al.*, 2001; Walker *et al.*, 2001; Logan *et al.*, 2003; Legg and Langhorne, 2004; Teasell and Kalra, 2005; Hoffmann *et al.*, 2008; Legg *et al.*, 2008).

An interesting result obtained in our study is the fact that withdrawing the OTH treatment temporarily did not cause the improvements achieved by the users affected by stroke to reverse. That is to say that the users affected by stroke could rest and take breaks from the intervention, because they tend to preserve what they have gained thanks to the treatment. Now, having said that, we need to bear in mind that interrupting the OTH treatment temporarily will lead to a greater or smaller evolution standstill, depending on the extent to which each user is affected.

As regards the main conclusion drawn from this study, we would like to point out that we have been able to verify the fact that an OTH programme significantly improves the cognitive abilities and the degree of independence for people who had had stroke. Moreover, because not only the users but also their

family members are highly satisfied with the OTH treatment, this leads to an improved quality of life for all of them, which in turn means lower healthcare costs.

Despite the low number of participants, being one of the limitations of our study, we still consider that it paves the way for implementing rehabilitation programmes in the home and, more specifically, for putting community OT programmes into practice. This particular scope is only just beginning in Spain.

In this sense, a recent study by López-Liria *et al.* (2013) clearly shows the need to carry out research about the effectiveness of rehabilitation treatments with the goal to plan how public healthcare systems should tackle them and how to improve those already being used. Furthermore, these researchers believe it necessary to put together multidisciplinary home-attention teams covering a larger share of the population as well as favouring functional independence.

Conflict of interest

The authors have not received financial aid from institutions for the realization of this work. We have not signed any agreement that we will receive fees from any commercial entity.

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