

## ORIGINAL ARTICLE

## VIDEOS TO IMPROVE THE SKILLS AND KNOWLEDGE OF STROKE PATIENTS' CAREGIVERS

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## ABSTRACT

**Objective:** To evaluate the effect of educational videos to improve the practical skills and knowledge of stroke patients' informal caregivers. **Materials and methods:** Pretest/posttest study. The participants were 10 caregivers aged 18 to 65 years and of both sexes of patients in the subacute phase of stroke. We developed eight educational videos related to positioning, mobilizations and transfers, which were implemented in the caregivers' and/or patients' homes along three days (on the first day, three videos; second day, three videos; and third day, two videos). Each video was viewed on a tablet for 30 minutes. We evaluated skills and knowledge before and after each video, and finally, the caregivers' satisfaction. We used three instruments, a checklist to assess practical skills, a questionnaire to assess knowledge, and another for satisfaction. **Results:** The practical skills score increased from 21,6 to 56,1 points ( $p < 0,001$ ) and knowledge from 11,6 to 21,6 points ( $p < 0,001$ ). 7/10 of the caregivers were very satisfied with the videos, 7/10 considered the words easy, 7/10 considered easy to put the indications into practice, 9/10 would definitely recommend the videos, and everyone considered them useful. **Conclusion:** Educational videos improve the practical skills and knowledge of stroke informal caregivers. Developed educational videos could be successful in training caregivers on the management of these patients.

**Keywords:** Stroke; Subacute Care; Home Care Services; Caregivers; Physical Therapy Specialty; Instructional Film and Video; Aptitude, Knowledge; Patient Satisfaction (source: MeSH NLM).

## INTRODUCTION

Patients who have suffered a cerebrovascular accident (CVA) and survived have sequelae, more than 80% of which are motor, including hemiplegia<sup>(1)</sup>. Therefore, they will be dependent patients and will require a caregiver, who is often a family member who adapts his or her own responsibilities and assumes that role even without adequate training (informal caregiver). Caregivers play a very important role, especially after hospital discharge<sup>(2,3)</sup>, which usually coincides with the subacute phase and is the stage when patients achieve most of their recovery<sup>(4)</sup>. Caregiver education is crucial to reduce risks to their own physical and mental health<sup>(5)</sup> and to prevent complications and promote patient recovery<sup>(6)</sup>.

For most caregivers and patients, discharge from the hospital is one of the most difficult times. The caregiver feels unprepared to return home, mainly due to lack of knowledge in dealing with the sequelae. In addition, they have reported the need for training in specific caregiving tasks, such as positioning, mobilizations and transfers<sup>(2,7)</sup>. Correct positioning, mobilizations and transfers protect joints, provide comfort and prevent complications such as respiratory problems, pressure ulcers, pain, contractures, shortening and swelling. They also

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promote recovery and maximize patient function through modulation of muscle tone, adequate sensory information, enhanced spatial perception, stabilization of body segments and neuromuscular activation<sup>(8,9)</sup>.

In Latin America, most patients have several limitations in accessing health services<sup>(10)</sup>. In Peru, especially in rural areas, health systems are saturated, have limited coverage and delayed access, the number of specialists is limited, and social inequity exists<sup>(11)</sup>. One study reported that in Lima none of the caregivers of patients who had suffered a stroke had received guidance on the care of their patients after hospital discharge<sup>(7)</sup>. This situation is aggravated in rural areas, where the percentage who know about and use rehabilitation services is lower, and the problem of accessibility related to transportation, distance and physical barriers is greater<sup>(12)</sup>.

The development of technology represents new opportunities to improve healthcare. Thus, mHealth or mobile health interventions such as telemedicine, videoconferencing, text messaging, mobile applications, among others, have been developed<sup>(12)</sup>. In addition, videos have shown to be effective educational tools. Videos aimed at patients with chronic obstructive pulmonary disease (COPD) have improved knowledge and technique in the use of inhalers<sup>(13)</sup>. Similarly, videos have increased the knowledge of stroke patients<sup>(14)</sup>, caregivers of asthma patients<sup>(15)</sup>, children with epilepsy<sup>(16)</sup> and patients in intensive care units<sup>(17)</sup>.

On the other hand, face-to-face training among caregivers themselves or with actors who act as patients, together with feedback from the health professional, have increased the knowledge and self-competence of caregivers of patients with dementia<sup>(18)</sup>, and the self-efficacy and preparedness for care of caregivers of cancer patients<sup>(19)</sup>, as well as the knowledge and practices reported in caregivers of patients with stroke<sup>(20)</sup>.

Although there is evidence demonstrating the efficacy of caregiver education, both face-to-face and with educational videos, most studies evaluate knowledge, self-efficacy or self-competence, not techniques or practical skills, especially related to positioning, mobilizations or transfers of patients who have suffered a stroke. In addition, there is a need to develop and evaluate culturally focused interventions that can serve as new forms of healthcare. The aim of the study was to evaluate the effect of educational videos to improve the practical skills and knowledge of informal caregivers of stroke patients.

## KEY MESSAGES

**Motivation for the study:** The training of stroke patients' caregivers is crucial for the health of the caregiver and the patient's recovery. However, there are limitations to access health services, and especially for this type of interventions, so it is required to develop and evaluate the effect of strategies and tools such as educational videos for such training.

**Main findings:** Educational videos were developed that improve the practical skills and knowledge of stroke patients' caregivers.

**Implications:** The videos can be used in the training of these caregivers.

## MATERIALS AND METHODS

### Study design and population

A pretest/posttest study was carried out. Participants were recruited from the hospitalization and emergency services of the Cayetano Heredia Hospital, Lima, Peru. The inclusion criteria considered subjects that were informal caregivers (family members) of patients who had suffered an ischemic stroke, were in the subacute phase (from the first seven days of symptom onset to the first three months)<sup>(4)</sup>, were stable and had hemiplegia. Also, the age of the caregivers should be greater than 18 and less than 65 years. Caregivers were excluded if they had severe cognitive, hearing or visual problems or if their patients were uncooperative due to their cognitive, neurological or psychiatric conditions; and/or had comorbidities affecting mobility, such as other neurological, orthopedic or trauma disorders.

### Educational videos

The educational videos included activities related to positioning, mobilizations and transfers for good management of patients in the subacute phase of stroke. The scripts for the videos were developed based on specialized literature<sup>(8,9,21,22)</sup> and the advice of seven experts: four medical technologists in physical therapy and rehabilitation, a geriatrician, a neurologist and a communicator. Scripts were recorded, followed by videos, cast with two characters: the study investigator acting as the caregiver and a professional actor as the patient. Three medical technologists in physical therapy and rehabilitation evaluated the videos and provided fee-

edback for improvement. Finally, we obtained eight educational videos lasting between 1 minute 15 seconds and 2 minutes 44 seconds, as well as an introductory video of 1 minute 15 seconds to explain mainly which side was considered affected (video 0).

The eight videos correspond to the following activities: video 1 - alignment of the patient in the prone position; video 2 - alignment in the prone position on the affected side; video 3 - alignment in the prone position on the healthy side; video 4 - how to elevate the patient's hips when lying on the back; video 5 - how to turn the patient on his affected and healthy side; video 6 - how to sit the patient on the edge of the bed from the prone position; video 7 - how to transfer the patient from a bed to a chair; video 8 - alignment of the patient when sitting in a chair. These videos are available at: [https://www.youtube.com/playlist?list=PLXIX1w9QhG-15NPITb0TqSkeYvbp3NzFT\\_](https://www.youtube.com/playlist?list=PLXIX1w9QhG-15NPITb0TqSkeYvbp3NzFT_)

### Instruments

For evaluating practical skills (Supplementary Material 1), a 68-item checklist was used and administered by the researcher. For evaluating knowledge (Supplementary Material 2), a questionnaire with 27 single-choice closed-ended questions was completed by the caregiver. In both instruments, one point was assigned for each item/correct answer and zero for each item/incorrect answer. To assess satisfaction (Supplementary Material 3), a questionnaire with 7 single-choice closed-ended questions and 3 open-ended questions was used and completed by the caregiver. The instruments were developed from the specialized literature used for the elaboration of the videos. Subsequently, the instruments were evaluated by five medical technologists in physical therapy and rehabilitation, according to the criteria of sufficiency, relevance and clarity, after which the respective corrections were made. Finally, the instruments to assess knowledge and satisfaction were applied to five potential caregivers in order to improve the semantics of the questions and alternatives, corrections were made and the final instruments were obtained.

### Procedures

Cases of patients with ischemic stroke were identified in the hospitalization and emergency services of the Cayetano Heredia Hospital and assessed to see if they met the selection criteria, and if so, a family member was contacted personally

or by telephone to find out who would be the patient's caregiver and at the same time verify if he or she met the selection criteria. If the caregiver met these criteria, the informed consent process was carried out in person at the hospital facilities or at the home of the patient and/or caregiver.

The intervention was performed after one day to three days after hospital discharge, in the caregiver's and/or patient's home. Videos were shown on a seven-inch tablet. Before starting the intervention, the caregiver was shown a video explaining mainly which side of the patient was affected in the videos (video 0). The maximum viewing time for each of the 8 videos was 30 minutes. Three videos were viewed on the first day, the next three on the second day, and the last two on the third day. The researcher, who was a medical technologist in physical therapy and rehabilitation, was present during the entire intervention to help the caregiver in case of problems with the handling of the tablet and/or any adverse event.

For the practical skills assessments of the eight videos, the caregiver was asked to perform each activity with the patient three times. Each activity item was scored as 1 if it was performed as indicated in at least two of the three repetitions, and 0 otherwise. For the knowledge assessment, each correct response was scored as 1 and 0 otherwise.

First, practical skills and knowledge were assessed for activity 1 (video 1). Second, caregivers watched video 1 (~30 min). Third, practical skills and knowledge were reassessed for that activity. This sequence was repeated for videos 2 through 8. Finally, after all eight videos, caregivers answered questions related to their satisfaction.

### Sample size and statistical analysis

The sample size calculation was carried out based on a quantitative change in the practical skills and knowledge score, so the sample size was only 10 participants. We considered a minimum mean difference for the practical skill level of 20 points and a maximum standard deviation of 20 points<sup>(13)</sup>, potency at 80% and a confidence level of 95%.

The Shapiro-Wilk test was used to verify the normal distribution of the post- and pre-differences for practical skills and knowledge, so the Student's t-test for paired samples was used for both cases. An alpha error of 5% was established for all hypothesis tests. All analyses were performed in the statistical program Stata SE version 15 (StataCorp LLC).

## Ethical aspects

The Ethics Committee of the Universidad Peruana Cayetano Heredia (Constancia 124-04-18) and of the Hospital Cayetano Heredia (Oficio No. 1129-2018) approved the study and the informed consent. The caregiver and patient received a copy of the signed informed consent.

## RESULTS

From August to December 2018, stroke patients and their caregivers were contacted. Of 30 patients with ischemic stroke, 13 were excluded, eight because they presented cognitive, neurological, or psychiatric conditions that did not allow them to collaborate in mobilizations and transfers; and five because they presented other neurological, orthopedic, or traumatological disorders that affected their mobility. The caregivers of the 17 patients were eligible, and seven refused to participate. The 10 patients and their caregivers were assigned to the educational videos, completed the intervention, and were finally analyzed (Figure 1). The characteristics of the caregivers and patients are presented in Table 1. There were 10 caregiver-patient pairs. All caregivers were female and 9 of 10 of the patients were male. The mean age of the patients was

older than the mean age of the caregivers ( $44.6 \pm 12.5$  vs.  $67.9 \pm 11.4$ ). 6 of 10 of the caregivers were caring for their parents and 6 of 10 of the patients were right-sided affected.

The pre- and post-intervention practical skills and knowledge are shown in Table 2. The post-pre- difference for practical skills was 34.5 points ( $p < 0.001$ ), representing a 50.7% increase in score, while for knowledge it was 10 points ( $p < 0.001$ ), an increase of 37%.

In relation to the satisfaction variable (Table 3). 7 out of 10 of the caregivers were very satisfied with the videos, 7 out of 10 considered that the words used were “easy” and another 7 considered it easy to put the indications into practice. Nine caregivers would definitely recommend the videos and all considered them useful. In addition, 2 of the caregivers had no favorite video, while others preferred video 2 - alignment in the position lying on the affected side, video 3 - alignment lying on the healthy side and video 7 how to transfer the patient from a bed to a chair. Some comments for video 2 were: “the patient rests better” and “I find it perfect for resting”; for video 3, “my dad feels more comfortable” and “it is more comfortable”; for video 7, “it was easier to do it” and “it is the most difficult position to move the patient”. On the other hand, only one indicated that she had a non-favorite

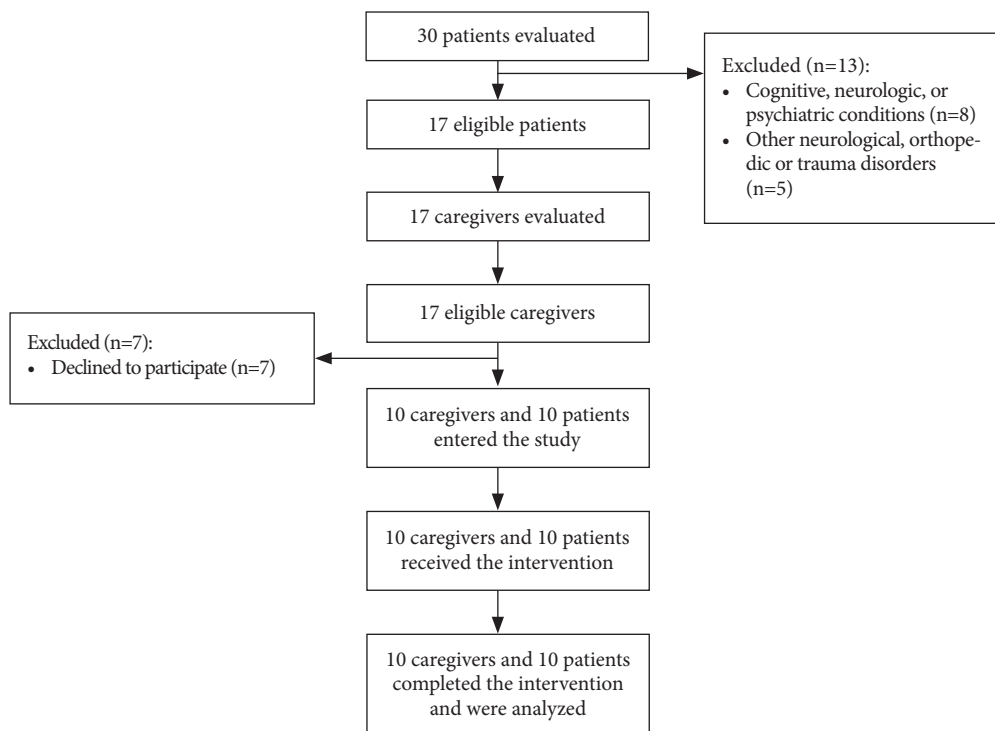


Figure 1. Flow chart of study participants.

**Table 1.** Characteristics of caregivers and patients in the subacute phase of stroke.

| Characteristics                 | Caregiver<br>n=10 | Patient<br>n=10 |
|---------------------------------|-------------------|-----------------|
| Age, mean (SD)                  | 44.6 (12.5)       | 67.9 (11.4)     |
| Sex                             |                   |                 |
| Male                            | 0                 | 9               |
| Female                          | 10                | 1               |
| Level of education              |                   |                 |
| Without schooling               | 0                 | 0               |
| Primary school                  | 2                 | 5               |
| Secondary school                | 2                 | 4               |
| Non-university higher education | 4                 | 0               |
| University education            | 2                 | 1               |
| Relationship                    |                   |                 |
| Daughter                        | 6                 |                 |
| Wife                            | 2                 |                 |
| Sister                          | 1                 |                 |
| Daughter-in-law                 | 1                 |                 |
| Affected side                   |                   |                 |
| Left                            |                   | 4               |
| Right                           |                   | 6               |

SD: standard deviation.

video (video 6 - how to sit the patient on the edge of the bed from the lying position). One observation for the video was: “the patient is very heavy for me”.

On the other hand, Supplementary Material 4 details the change in practical ability for each item, while Supplementary Material 5 details the change in knowledge for each question. “No-No” means that, on the pre- and post-assessment, the item/answer was incorrect. “No-Yes” (what is expected to be found with the intervention) indicates that on the pre-assessment the item/response was incorrect, but on the post-assessment it was correct. “Yes-No” means that on the pre-assessment the item/response was correct, but on the

post-assessment it was incorrect. “Yes-Yes” indicates that in the pre-assessment and post-assessment the item/response was correct.

## DISCUSSION

This research shows that educational videos improve the practical skills and knowledge of caregivers of subacute stroke patients, specifically on positioning, mobilizations and transfers. On the other hand, caregivers had a positive perception of the videos and no adverse events were reported during the intervention.

The improvement in practical skills was similar to what was found in a research that used educational videos to enhance three inhaler use techniques in COPD patients (22.7%, 22.9%, and 12.8%)<sup>(13)</sup>, as well as in another research about improving face-to-face training for caregivers of patients with stroke on medication, food intake, correct posture, ulcer prevention, among others (16.7%)<sup>(20)</sup>. Although the improvement in practical skills in our study was greater, this could be due to the fact that COPD patients were on average 20 years older than the population in this investigation (67.7 versus 44.6 years), which would imply a different learning curve. Also, because the evaluation of caregivers of stroke patients trained in person was through self-reporting, while in this study it was through the researcher’s evaluation with a checklist.

Regarding knowledge, both classroom training of stroke patients<sup>(20)</sup> and videos of caregivers of patients with asthma<sup>(15)</sup>, children with epilepsy<sup>(16)</sup>, and patients in intensive care<sup>(17)</sup>, have increased knowledge of the pathology, health condition, or management, despite the fact that adaptations of validated questionnaires, validated questionnaires, or questionnaires developed for research without a formal validation process have been used to assess knowledge. Some studies have not considered the educational level of the caregivers, and in others, as in this one, it has been found that

**Table 2.** Practical skills and knowledge of caregivers on positioning, mobilizations, and transfers for subacute stroke patients.

| Caregiver measurement | Mean (SD)  |            | Difference between means (95% CI) | p Value |
|-----------------------|------------|------------|-----------------------------------|---------|
|                       | Pre        | Pos        |                                   |         |
| Level of practice     | 21.6 (5.5) | 56.1 (6.9) | 34.5 (29.0-40.1)                  | <0.001* |
| Knowledge level       | 11.6 (3.7) | 21.6 (3.9) | 10.0 (7.4-12.6)                   | <0.001* |

CI: confidence interval; SD: standard deviation.

\* Student’s t-test for paired samples.



most caregivers had at least a high school level of education. Therefore, this type of intervention could have different effects on the knowledge of the participants according to their level of education.

It is important to assess caregivers' satisfaction to know their experience regarding the videos. Positive results were found in other single-group investigations with pretest and posttest<sup>(14,23)</sup>; however, in quasi-experimental studies with a non-equivalent control group, videos have not demonstrated superiority over other methods, for example, adding videos to a comprehensive educational approach does not change the level of satisfaction<sup>(24)</sup>, nor do caregivers notice differences between the usefulness of videos or paper instructions<sup>(25)</sup>.

Our research did not evaluate clinical indicators, unlike some studies that have determined that videos before an intrathecal chemotherapy procedure decrease anxiety levels<sup>(26)</sup> or the number of complications in patients with sequelae of stroke<sup>(27)</sup>. However, according to Kirkpatrick's model, which evaluates training programs in 4 levels; satisfaction, knowledge and practical skills correspond to the first two levels (reaction level and learning level), which are necessary and important to impact on higher levels (behavioral level and outcome level)<sup>(28)</sup>. On the other hand, several theories and principles were taken into account for the development of the videos in order to maximize the caregiver's learning, among them, theories such as cognitive load and the cognitive theory of multimedia learning; and principles such as signaling, segmentation, weeding and matching modality<sup>(29)</sup>.

This study has some limitations; therefore, the results should be interpreted with caution. First, observation bias, because the researcher was the one who performed the pre and post assessment, which could explain that the difference in practical skills was greater than that of knowledge. Second, the presence of the researcher could have a positive influence on the caregivers' practical skills because they felt observed or more confident. However, the differences found in practical skills and knowledge were high; 50.7% and 37%, respectively. Third, there is no control group to identify the real effect of the intervention; however, it is unlikely that the dramatic improvement observed in both practice and knowledge in a short time can be explained by secular trends, or by the gradual acquisition of experience in managing these patients. Fourth, the sample size was small, since the estimate was made on the basis of an expected difference of 20 points; however, there is no evidence that this is a value

**Table 3.** Caregivers' satisfaction with the videos.

| Dimension                          | n  |
|------------------------------------|----|
| Satisfaction                       |    |
| Satisfied                          | 3  |
| Very satisfied                     | 7  |
| Words used in the videos           |    |
| Very hard                          | 1  |
| Easy                               | 7  |
| Very easy                          | 2  |
| Practice of what has been observed |    |
| Neither easy nor difficult         | 3  |
| Easy                               | 7  |
| Would recommend the videos         |    |
| Probably yes                       | 1  |
| Definitely yes                     | 9  |
| Usefulness of videos               |    |
| Definitely yes                     | 10 |
| Preferred video                    |    |
| I have no preference               | 2  |
| Video 2                            | 2  |
| Video 3                            | 2  |
| Video 5                            | 1  |
| Video 6                            | 1  |
| Video 7                            | 2  |
| Least preferred video              |    |
| I have no preference               | 9  |
| Video 6                            | 1  |

accepted as relevant to see changes. Fifth, the instruments used were self-developed and had no formal validation, although they were developed based on specialized literature, expert judgment and a pilot. Sixth, there was no follow-up to assess the effect over time, although it is likely that knowledge tends to decrease<sup>(30)</sup> and even practical skills. Seventh, the evaluation was conducted immediately after the intervention, which does not necessarily mean that caregivers put into practice what they learned; however, according to Kirkpatrick's model, the evaluation conducted is necessary to subsequently assess behavioral change.

The educational videos that have been developed could be used to train caregivers on the management of stroke patients, and even be part of an ongoing comprehensive training program that also includes face-to-face training, practice on simulated patients, among other strategies. On the other hand, although the videos have been developed for

stroke patients with certain clinical characteristics, these videos could be useful in other stroke conditions, as indicated by specialists; and even in other types of patients whose mobility is affected, for example, in geriatric patients, palliative care patients and hospitalized patients. The advantages of the videos are that they are practical, inexpensive tools once produced, people can learn at their own pace, and many people can access the videos at the same time without a healthcare professional necessarily being present.

The educational videos improve the practical skills and knowledge of informal caregivers of subacute stroke patients. In addition, the caregivers received the videos positively, were very satisfied, considered the words of the videos to be “easy” and put the indications into practice, would definitely recommend them and considered them useful. It is recommended that improved versions of the videos be developed based on the analysis that has been done for each of the items and questions for practical skills and knowledge, respectively. In addition, studies should be carried out to conduct long-term follow-up on the indicators evaluated

and to assess the impact of the training, for example, on clinical indicators in patients and on mental health indicators in caregivers.

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