RIASE
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STRATEGIES FOR RECOVERING FACIAL EXPRESSION AFTER CENTRAL FACIAL PARESIS

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ABSTRACT

In Portugal there is a decrease in the incidence of stroke. However, the resulting disabilities and disadvantages continue to be the most varied and have a great impact on people's lives, including Central Facial Paresis.

Objectives: Applying and evaluate a Rehabilitation Nursing Plan focused in Central Facial Paresis.

Methodology: Case study carried out in the final stage of the master's degree in nursing. He was integrated with 3 people with central facial paresis who were submitted to a facial mime re-education plan. The National Scales of the National Stroke Scale (NIHSS) and the House Brackmann scales were used to assess the neurological status, particularly in facial paresis. Participants were aware and accepted to participate in the program.

Results: 3 participants were selected for integration into the Rehabilitation program, with 2 participants presenting relevant gains.

Conclusions: It is demonstrates that facial mime therapy decreases facial asymmetry and influence on dysphagia, dysarthria and change in self image.

Keywords: Stroke; rehabilitation nursing; facial paralysis.

INTRODUCTION

The Cerebrovascular Accident (CVA), also commonly known as a stroke, is the number one pathology when it comes to mortality and disability rates[1]. Therefore, it becomes imperative for health professionals to execute effective therapeutic interventions. When you consider the individual as the main focus of rehabilitation, all interventions should promote the highest standards of quality of life, prioritizing the individual's dignity, self-esteem and independence[2].

The Rehabilitation Nursing plays a major role in facilitating the individual's adaptation to a new reality. The specialist's core competences allow him to direct the intervention towards maximizing the individual's independence, through a careful process of re-adaptation to cope with the existing deficits, so the individual can fulfill his activities of daily living (ADL) and basic necessities[3].

The consequences of a stroke (particularly disabilities and loss of autonomy) will be reflected in a loss of balance and a change in the individual's relationship with his surroundings, which may condition his "life project"[4], since it restricts him from fulfilling his

social, personal, professional and family obligations. ADLs are an integral part of a person's life, as they allow the fulfillment of basic necessities and other daily self-care tasks. The limitations of a patient who suffered a stroke are easily observable in these areas[4].

Changes in mobility serve as an alert for a potential alteration deemed to be an emergence, as is the case with a stroke. They "are related to the changes in strength and muscle tone, the mechanism of postural control and sensitivity", serving as predictors for "loss of movement patterns on the affected half-body, as well as inadequate patterns on the non-affect side"[4]. The central facial paresis (CFP) is one of the most common consequences of a mobility alteration post-stroke. It will often attract people's attention since it's fairly recognizable due to the changes in facial mimicry.

The importance of facial movement is noticed in both verbal and non-verbal communication, feeding and eye protection. Therefore, central facial paresis presents a functional and aesthetic defect, manifested by facial asymmetry and muscular impairment in the lower half of the face, loss of saliva through the corner of the mouth, an asymmetrical smile and difficulties with proper articulation of words due to atony in the lips, tongue and throat[5].

An individual's facial expression reflects that person's psychological state. If one is unable to express himself that may lead to serious consequences, as users with symptoms of depression have bigger struggles with rehabilitation, endure longer hospitalization periods, have more difficulty returning home and an overall worse quality of life[5].

Recovery exercises for central facial paresis

Neuromuscular re-education is the first treatment for people with central facial palsy. This exercise promotes facial symmetry and expression[6] which in turn will improve feeding and communication. It's a conventional method which can be performed as an outpatient and allows "the recovery of symmetrical facial movement and the reduction or elimination of problems linked with speech and swallowing"[6].

However, reeducation of the facial mimetic muscles is a long and meticulous process which demands great concentration from the individual. It's usually advised to perform these exercises twice per day[4].

In the affected hemiface, moist heats should be applied for 10 minutes before the exercise, if it's currently in the flaccid phase, and for 15 minutes in the hypertonic phase[7]. The following exercises must be performed in front of a mirror[8] since they showcase more effective results than if they were performed without visual aid[8].

Manikandan reveals in his study that users were instructed to perform 5 to 10 repetitions of facial exercises, three times a day, to avoid fatigue[6]. We should emphasize that while training facial mimicry, the person must perform the requested movement while observing his reflection in the mirror, paying close attention to the affected hemiface, while receiving guidance regarding "variations in speed, strength, number of repetitions and rest intervals". It is advised that once these exercises have already been systematized, the use of the mirror should be alternated[4,6], meaning that sometimes it should be used, sometimes it shouldn't.

Facial mimicry therapy is built around the development of "a conscious connection between the use of certain mimetic muscles and facial emotional expression"[6]. All exercises can be performed attempting to mimic a certain facial expression or focusing on the use of certain mimetic muscles to achieve the desired expression. Manikandan provides a few examples of what the user may be asked to do, such as raising his forehead and pretending to look astonished, raising his upper lip in an air of sorrow or squeezing his lips as if he is angry[9]. Additionally, he may also smile, show his teeth, whistle, fill his mouth with air and depress his lower lip[4]. Another group was instructed to perform exercises that use the affected musculature in order to inhibit the participation of the unaffected side[6].

In the plan to reeducate facial mimetic muscles, certain stimulation techniques may be included, such as stimulation through vibrations, short vibrations applied on the affected facial mimetic muscles, digital pulps and the application of ice cube for up to 10 minutes[8].

The plan should include muscle relaxation techniques, such as an endobuccal massage that can be self-performed, by placing the hand contralaterally to the affected hemiface in the opposite direction to the muscle spine, then placing the thumb in the oral cavity and the remaining fingers in the hemiface[7,8]. The professional can also perform the massage by placing "the second finger inside the oral cavity and the thumb on the outside, keeping the facial mimetic muscles in a stretched position". The massage focuses on relaxing and mobilizing both sides of the face[9]. Contraction-relaxation exercises should also be performed – contraction maintained between 3 to 5 seconds, then followed by a complete relaxation[4] – as well as facial hand percussion the affected hemiface[4].

In addition to the previously described exercises, the training plan should contain passive stretching techniques to be used in oral or perioral muscles, holding the muscle that's meant to be stretched[4]. Performing stretching exercises on the affected side will help soothe the muscles involved in the facial mime synchrony, which is an important step since that synchrony can lead to an increase in muscle tone[9].

Since the current project is being carried out in a Stroke Unit, with the main goal of stabilizing the person's clinical situation and initiating the CFP training plan in the flaccid phase, we're applying the stimulation technique and facial muscle reeducation with the aim of training facial mimicry, with support from visual stimulation using a mirror and the passive stretching technique. To intensify the plan, we distributed a brochure listing all the exercises and the required information to perform them without professional assistance.

METHODOLOGY

A case study method of descriptive nature was applied in this case. The project was implemented in a Stroke Unit at a Central Hospital, between September 20th and November 20th of 2017. The goals were to evaluate the degree of facial paresis and then implement and evaluate a rehabilitation intervention program focused on the central facial paresis, which would be carried out by rehabilitation nursing specialists.

The participants were chosen based on the following criteria: medical diagnosis upon admission listing a stroke; existing central facial paresis; global neurological assessment with a score under 17 points on the National Institutes of Health Stroke Scale (NIHSS); willingness to participate in the study and a clear understanding of its purpose.

The global neurological assessment (NIHSS) and the degree of facial paresis (House Brackmann Scale) were the main instruments used, both in the initial and final evaluation of the participants.

The NIHSS scale allows us to perform neurological examinations on people with acute strokes through the assessment of 11 abilities ("level of consciousness; ocular deviation; facial paresis; language; speech; neglect/extinction; motor and sensitive functions of the members; ataxia"). The score varies between 0 and 42 points, where 0 does not present a neurological deficit and 42 defines a person in a comatose state[10]. Since the scale is converted into a final score and the actual severity is not explained, consulting another author was required to obtain a clear definition. In a study developed by Briggs et. al[11] concerning the NIHSS scale, the following was observed: a score inferior to 8 is indicative of a mild neurological deficit; a score between 8 and 17 corresponds to a moderate neurological deficit and a score over 17 matches a severe neurological deficit.

The type of paresis can be roughly identified through observation. However, for a more objective assessment we used the House Brackman Scale, a widely adopted instrument for evaluation of facial paresis, which is also used by the American Academy of Otolaryngology. This instrument is used to identify the degree of nerve damage in a facial paralysis, with six degrees of differentiation: Grade I is described as normal function; Grade II is a slight disfunction; Grade III is a moderate disfunction; Grade IV is a moderately severe disfunction; Grade V is a severe disfunction and Grave VI is a total paralysis. Each degree should meet the different items defined in the grading system[11].

We sought advice from the Ethics Committee on Health and Welfare of the University of Évora and the Ethics Committee for Health of the Hospital Center of Algarve. We received positive replies, as well as authorization to implement the program. We requested the participant to sign an Informed Consent, which included permission to keep photographic records of the facial expression, while preserving his anonymity.

In terms of resources, the project required the following: rehabilitation nursing care with an average duration of 10 minutes per individual intervention, multiplied by 3 or 4 days, for a total of 9 to 12 interventions; a mirror; balloons; ice cubes; a digital camera; a brochure with the facial exercises; consumables for logging data throughout the study.

The intervention plan was developed with the following guidelines:

i) Initial evaluation according to the established criteria;

ii) Elaboration of a re-education plan targeting the facial mimetic muscles based on the degree of severity, in collaboration with the participant. Afterwards the person was expected to execute the plan with the sole aid of a mirror, prioritizing the person's autonomy while performing the exercises;

iii) Suitability of the plan to the person's needs;

iv) Implementing photographic records after the patient's approval to participate in the program, both at the start and end of the program (or until the patient is transfered to another service, after 3 to 4 days).

The following procedures were adopted:

- Confront the person with his or her facial image, with the aid of a mirror, explaining the visible alterations and possible consequences;
- During 10 minutes, apply a towel that was soaked in hot water;
- Educate and assist the person on how to perform a proper facial massage, slowly massaging the facial mimetic muscles in different directions;
- Provide a detailed brochure explaining the various facial exercises (compressing the lips, smiling without showing teeth, filling the cheeks with air and protruding the lower lip), with the main goal of stimulating the different lower facial mimetic muscles.
- Help the patient perform the exercises listed in the brochure and understand the different facial movements, using series of five repetitions per exercise;
- Assist the patient through another round of exercises while incorporating a mirror, to incentivize observation while the exercises are being performed;
- Once the patient understood the exercises, request him/her to perform them 3 to 4 times per day while gradually increasing the number of repetitions, going up to 10 repetitions per exercise in the second day and 15 repetitions per exercise in the third day;
- At the end of each training period, perform another facial massage;
- Incentivize pauses when the patient shows any signs of fatigue. During these pauses, the patient is instructed to perform abdominal-diaphragmatic breathing with dissociation of respiratory times.

RESULTS

The patients who were asked to incorporate the group of participants displayed the following attributes: the average age was 68 years, with patients ranging from 59 years old to 78 years old. The most prevalent cause of stroke was ischemic and the pathological background every patient shared was Arterial Hypertension. We observed a relationship between CFP and either hemiparesis or monoparesis in 67% of our patients. In terms of relationship between CFP and dysarthria, every individual experienced this symptomatology; CFP and dysphagia were experienced by 67% of our patients while CFP, dysarthria and dysphagia were experienced by 67% as well.

After applying the selection criteria, it was verified that only 3 users met the participation conditions. Thus, we refer to the results by participant.

Participant 1

The first person is a 66 years old man, admitted with an ischemic stroke, with a history of cardiac problems and Chronic Obstructive Pulmonary Disease (COPD) caused by smoking. Because of the stroke, the patient exhibited a mild dysphagia for liquids, which was compensated with the addition of nectar-type thickener and improved with flexion of the neck. The patient also had dysarthria and loss of saliva through the right labial commissure. It was verified that the facial mimetic muscles of the lower right facial quadrant are depressed compared to the lateral ones.

There was a slight neurological deficit (NIHSS with 6 points) and evident, but not disfiguring, paresthesia, with obvious deviation of the mouth, with spasms, contractures and synkinesis (House-Brackmann scale with 3 points) as shown in figure 1.

After implementing the previously defined exercise plan aimed at rehabilitating the central facial paresis, the first day was comprised of an evaluation, an instruction period and assisted training in every session.

On the second day we introduced a balloon as part of the training, as a way to increase resistance and perform specialized training of the buccinator and orbicularis oris muscles. The participant was asked to fill the balloon with air at the end of each exercise, for the same amount of repetitions as the previous exercise.

The instruction period was kept at 10 minutes, after which the participant started performing the exercise autonomously, usually at a frequency higher than it was requested.

On the third day we conducted an evaluation, where we observed a mild neurological deficit (3 points on the NIHSS), a mild paresis only discernible upon close inspection, an asymmetry during forced smile, without any complications (2 points on the House-Brackmann score), as represented in Figure 1.

Figure 1 – Participant 1, comparison between first and second evaluation.

Caption of the affected muscules on the lower face:

1 – Nasalis;
2 – Levator Labii superioris;
3 – Zygomticus minor;
4 – Zygomticus major;
5 – Levator anguli oris;
6 – Buccinator muscle;
7 – Risorius;
8 – Depressor anguli oris;
9 – Depressor labii inferiorii muscle;
10 – Mentalis;
11 – Orbicularis;
12 – Platysma.

Participant 2

The second participant is a 59 year old man, admitted by ischemic stroke. immediate sequelae included left-side hemianopsia, left side hemiparesis with an alteration of the fine motor skills, dysmetria during the finger-nose and heel-knee tests (more pronounced on the affected side of the body) and an alteration of the static balance while standing, being unable to retain his balance autonomously. He exhibited a labial commissure deviation to the left side, slight erasure of the nasolabial sulcus, loss of saliva through the left labial commissure (in a small quantity) and mild dysarthria. The facial mimetic muscles on the lower left facial quadrant appeared to be depressed compared to the opposite side.

After evaluation, we verified a moderate neurological deficit (11 points on the NIHSS), mild paresis only discernible upon close inspection, asymmetry during forced smile, without any complications (2 points on the House-Brackmann score), as shown in Figure 2.

We implemented the exercise plan for rehabilitation of central facial paresis. The first day included an evaluation, an instruction period and assisted training in every session.

It was quickly observed that the participant showcased some difficulties following the guidelines, which resulted in the incorrect performance of the exercises. In an attempt to overcome his challenges, sensorial stimulation was performed by placing an ice cube inside the oral cavity, mainly on the left hemiface. This was done after the intra-oral massage we conducted at the end of the exercises.

At the end of the third day, the speech was more discernible and there was no loss of saliva through the left labial commissure. Another evaluation was performed, which showcased a mild neurological deficit (8 points on the NIHSS) and a mild paresis, only discernible through careful inspection, asymmetry only during forced smile and no complications (2 points on the House-Brackmann score).

Despite receiving instruction for 25 minutes, the patient was unable to perform the training independently, only being able to execute it with additional incentive and thorough assistance from the rehabilitation nursing specialist.

There was no discernible difference observed in facial expression (except in the muscles Depressor labii inferiorii e Mentalis although there was a slight improvement in terms of diction and no loss of saliva through the labial commissure.

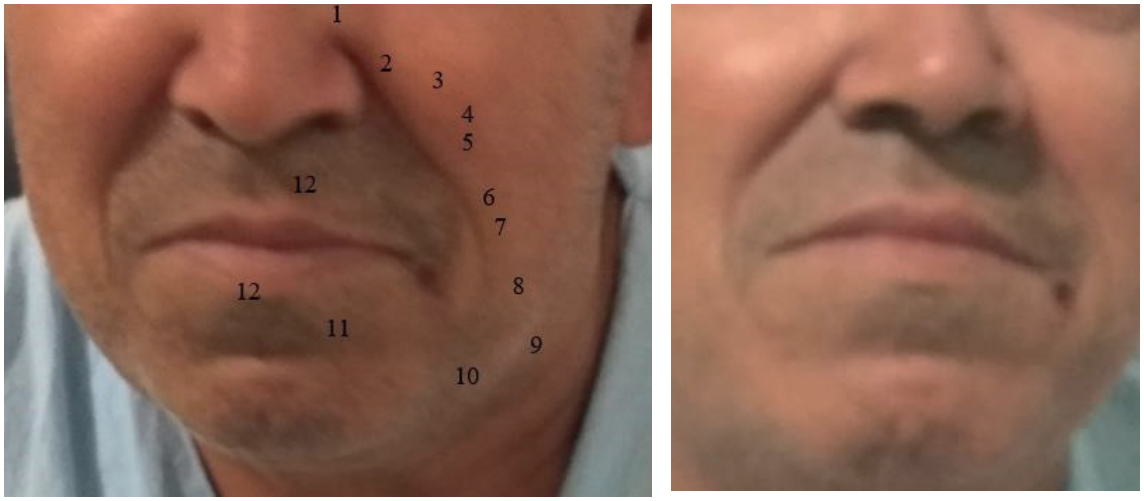

Figure 2 – Participant 2, comparison between the first and second evaluation.

Legend:

1 – Nasalis;
2 – Levator Labii superioris;
3 – Zygomticus minor;
4 – Zygomticus major;
5 – Levator anguli oris;
6 – Buccinator;
7 – Risorius;
8 – Depressor anguli oris;
9 – Platysma;
10 – Square muscle of the chin;
11 – Depressor labii inferiorii;
12 – Orbicularis.

Participante 3

The third participant is a 78 years old man, admitted by ischemic stroke. immediate sequelae included left side hemiparesis with degree force 3/5 second lower scale. The patient also had imperceptible dysarthria and deviation of the labial commissure with loss of saliva through the left labial commissure, with elimination of the nasolabial sulcus. The patient exhibited a mild dysphagia for liquids, which was compensated with the addition of pudding-type thickener and improved with flexion of the neck.

After evaluation, we verified a light neurological deficit (8 points on the NIHSS), evident and disfiguring paresthesia, (4 points on the House-Brackmann score), as shown in Figure 3.

The instruction period was kept at 9 minutes, after which the participant started performing the exercise autonomously, usually at a frequency higher than it was requested.

On the fourth day, the situation was evaluated, asking the user to fill a balloon with air to observe the labial closure, having done it properly. The final evaluation showed slight neurological deficit (4 points on NIHSS) and mildly detectable mild paresis with careful inspection; asymmetry only in forced smile, with no complications (2 points in House Brackmann)

Figure 3 illustrates the decrease in physical changes such as facial symmetry and erasure of the improved nasolabial groove.

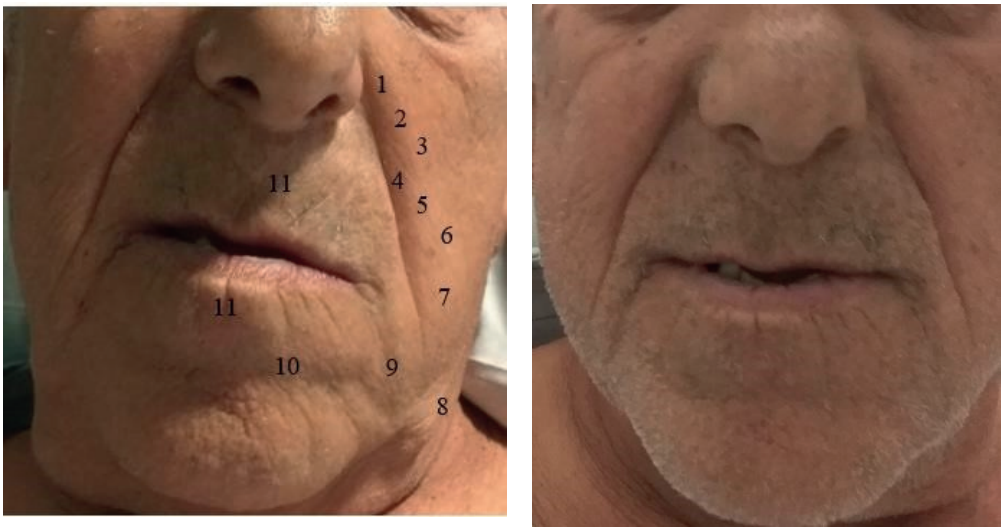

Figure 3 – Participant 3, comparison between the first and second evaluation.

Legend:

1 – Levator Labii superioris;	4 – Canine;	7 – Depressor anguli oris;	10 – Depressor labii inferiorii;
2 – Zygomticus minor;	5 – Levator anguli oris;	8 – Platysma;	11 – Orbicularis.
3 – Zygomticus major;	6 – Risorius;	9 – Mentalis;	

DISCUSSION

In all participants, the presence of CFP was always accompanied by other conditions, such as dysphagia, dysarthria and loss of saliva through the labial commissure, which usually amplified their struggle to perform facial expressions, portray emotions and in the exercise of citizenship.

Our analysis of each case, both before and after the re-education plan was implemented, was comprised of a global neurological evaluation, a facial paresis assessment and a direct observation of situations where dysarthria, loss of saliva and dysphagia were detected.

Participants 1 and 3 revealed improvements which we believe are easily recognizable through simple observation and while the second participant didn't display the same level of progress, he also exhibited a general improvement in his dysarthria and retention of saliva.

Our implementation of the professional intervention plan, specifically the facial mimicry training, represents the harmonization between the intervention and the obvious gains expressed by other authors in their studies[4,5,9,12,13]. The results obtained are in line with those of the aforementioned authors, which are unanimous in both importance and relevance. Even in situations where the facial expression does not change, there may be improvements in verbal expression and loss of saliva, as we have showcased in this project.

We believe we managed to minimize immediate complications with a long-term impact, particularly those with direct implications on facial mimicry, self-image and overall quality of life.

The balloons were a valuable addition, as they transmitted visual and sensitive information to the participants. This method proved to be a fairly objective strategy, since the user can only fill the balloon if his or her lips are properly sealed. Additionally, we cannot overstate the importance of the ice cubes, specifically to stimulate lip closure and therefore diminish the loss of liquids through the commissure.

We also noticed users were performing the exercises at a higher rate than originally requested, which could have boosted their recovery of facial expression. This seems to suggest a positive reinforcement to their gains and, as such, presents an added value.

The results lead us to acknowledge that an intervention plan with proper instruction and facial mimicry exercises oriented towards the person with CFP should be implemented by rehabilitation nursing experts. We are of the opinion that positive evolution contributes to breaking social isolation, although we did not collect specific data in this study to justify this claim.

If we want to analyze the financial impact this type of program may present, we should take into account the time savings and gains associated with the effectiveness of the treatment. Each user requires on average 34 minutes for instruction and initial training; we believe this to be a fair cost, since the time spent on training and providing instruction is quite relevant for users to continue either autonomously or under supervision, both at the hospital and at home[9]. Time spent on training does not prove to be a limitation since the participants – after understanding the goals and how to perform the exercises – will reap the rewards while performing the exercises autonomously.

Once we implemented the project, we were able to verify that the instruction time is variable and should be customized, since it's highly dependent on the person's cognitive capacity and mood.

Other variables to consider are motivation, functional capacity and degree of interest exhibited by the participant. This is particularly evident in the instance where the person with the lowest degree of CFP appeared to be less involved and as such didn't showcase the same level of success as the remaining participants.

Based on other authors' findings[5,12], this type of intervention – whether directly or indirectly – has shown a decrease in hospitalization time and hospital re-admission, as well as a decrease in institutional costs.

The implementation of the training project which includes this plan/program – *Recovering facial expression after central facial paresis – Implications on Rehabilitation Nursing Practice*, indicates that its application on other users should be equally positive.

We faced some limitations, namely the specific bibliography that was available to consult, which was mainly targeted towards peripheral facial paralysis and the quality of life after facial paresis. This was one of the reasons we decided to build a plan with procedures, exercises and elements best suited to rehabilitate the person with CFP. In the battery of exercises chosen from the bibliographic research, we found that there was no consensus regarding the number of daily repetitions or intensity of the exercise. This led us to propose a specific sequence, which may have contributed to the positive outcome.

Each user could autonomously repeat all the exercises throughout the day at a frequency and cadence that felt comfortable, without any interference from the Rehabilitation Nurse. Therefore it's not possible to verify the maximum number of repetitions per exercise that each user performed. However, they were found beneficial in the re-education process. Being involved, feeling useful and staying busy may have contributed to a higher degree of adherence.

We can now acknowledge that the application of facial mimicry training – despite being a relatively simple method – in combination with other technological means, such as electrostimulation, could potentiate more relevant gains in the same time period.

The small amount of cases and the short time associated with this clinical experience is also presented as a limitation, which led us to restrict the variables of the program. Even so the results demonstrate that the program can be used to rehabilitate people.

In the future, our plan is to implement and/or adapt this plan to a larger population, over a longer period of time. This will help us consolidate results, so that we can devise a specific rehabilitation intervention plan and seek to improve the quality of specialized nursing care, thus creating evidence. Adding the study of performance variables in daily and instrumental life activities, as well as its impact on quality of life, will allow for a more comprehensive approach to the situation experienced by the person and open new avenues for continuous home care.

The studies we have consulted, and our work experience lead us to suggest additional research should focus on CFP, particularly aimed towards improving the duration and frequency of the rehabilitation interventions, as is already the case with peripheral facial paresis. A transdisciplinary approach is required to reconcile the different interventions with a focus on rehabilitating the individual.

CONCLUSION

The facial re-education plan allowed the recovery of facial expression on three patients, including the ability to swallow and properly articulate words. The patient's involvement and adherence to the program is fundamental to ensure an active role during the recovery period. The partnership established between the rehabilitation nursing specialist and the patient is the cornerstone of success.

The final results demonstrate how the patient's willpower and training, after possessing the right knowledge, allows them to have a positive and effective impact on the evolution of the paresis, after the critical period.

In professional terms, we believe the additional time spent educating the patient is not detrimental to our work organization, nor does it bring any sort of increase in expenses.

We believe the plan has an immediate positive impact and improves the patient's long--term prospects, since it reduces adverse consequences which commonly occur when the situation is left unaddressed and follows its natural progression.

The intervention in the field of rehabilitation allowed us to extract benefits for the people under our care, as well as reinforcing good practices and improving Nursing by extension, particularly when it comes to Rehabilitation.

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