

The monitoring of Home Rehabilitation in Deaf Patient Care, pre and during COVID-19 emergency

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Abstract

In this study, we report our experience with telemedicine (TM) as a rehabilitation method in Hearing Aid users and cochlear implant recipients with video-conference (VDC), and how telemedicine has been incorporated into our protocol during the COVID-19 emergency. The Audiovestibology Unit of ASST-Settelaghi, Varese, introduced TM in 1995. This was the first time TM was made available in Italy. We introduced rehabilitative protocols for TM for both paediatric and adult deaf patients. In March 2020, due to the COVID-19 emergency, Italy was placed in lockdown. This meant that patients could not be treated through our regular on-site service. In response to this situation, we developed a new solution for rehabilitative therapy. The solution we developed utilized VDC to provide a smart-working approach. Our new solution was built on a VDC Patient Survey. The survey had thirty multiple-choice questions and could be compiled by adult patients or by the child's parents. In the period from the 1st of March to the 20th of April, there were 404 rehabilitative sessions with VDC. 93,8% (374) of VDC sessions involved child patients. The remaining 6,2% (25) were adult patients. A total of 105 patients are followed via the VDC service, all of whom answered our initial VDC Patient Survey. During recent years, VDC has shown to be an efficient and key tool for auditory rehabilitation. The survey results support the vital role of VDC in our method - particularly in aiding our programming of future therapeutic plans.

Keywords: Videoconference, deaf patients rehabilitation, COVID-19, Cochlear Implant.

Introduction

The term TM encompasses a broad range of telecommunication technologies that allow health services to be delivered remotely. The need to provide medical care to distant underserved patients has existed for a long time. TM has only been used in the last few decades but is rapidly being used to meet this need. The global compounded annual growth rate of TM is between 13% and 27% (Waller 2018).

A recent systematic literature review on telehealth and patient satisfaction (Kruse 2017) concluded that technology is now easy to use and cost is no longer a barrier. TM improves communication between providers and patients, improves access to care and empowers patients to care for their chronic conditions, and improves medication adherence. All of these improvements occur while wait times decrease.

TM is usually divided into in-patient visits (in which the patient is hospitalized) and ambulatory visits. Using TM can reduce the need to transport patients to a facility where specialists are located. The most common use of TM in the ambulatory setting is to reduce the distance that a patient needs to cover to see a provider (Merriam-Webster 2018). The use of telecommunication technology also provides rehabilitation and long-term support to people with disability (Burns 1998). The first scientific publications on telerehabilitation date to 1998 and 1999 (Alsup 1999). In the beginning, TM was used primarily in cardiac, neurological and physiotherapy rehabilitation (Peretti 2017).

Further potential advantages to implementing TM protocols include: the possibility of providing real-time monitoring of adverse events; facilitating therapeutic compliance; reducing social disparities in the access to care; promoting patients' active role in diagnostic and therapeutic processes; and reducing waiting time and economic burden - particularly for people affected by chronic illnesses (Michaud 2018). The application of TM may involve monitoring multiple symptoms remotely using portable devices, with relevant therapeutic implications, especially for clinically fragile populations (Martinez 2018).

The advantages of Telerehabilitation systems are that they are: cost effective; provide health service in rural areas; enlarge the rehabilitation opportunities by using computer-aided systems; improve the quality of life; reduce medical costs by increasing the number of patients treated in a single day or by a single professional unit and reduces travel time. The disadvantage is that there is less human contact (face-to-face interaction).

The scientific literature lacks comprehensive studies providing evidence for supporting decision- and policy-makers in adopting telerehabilitation technologies in the clinical practice.

The Audiovestibology Unit of ASST-Settelaghi Varese developed a rehabilitative method for deaf patients in the last decade of the previous century (Burdo 1995). We introduced TM in rehabilitative protocols of deaf patients in 1995 - which was the first time TM has been used this way in Italy. This

procedure can be classified in Telehealth: Health education/training delivered over distance (Bushshur 2011). The initial idea was to reduce costs for families who lived in other parts of Italy, and who had to travel to our unit quite often. However, after some years, we realized that this technological innovation was a useful tool not just for monitoring and measuring improvements but also for supervising and providing feedback on the communication style.

During the present emergency, due to COVID-19, people must maintain a proper distance from each other to contain the pandemic. This requirement meant patients were not able to access their medical center of reference for face-to-face therapy sessions.

In this study, we report our experience with telemedicine (TM) as a rehabilitation method in Hearing Aids users and cochlear implant recipients with video-conference (VDC), and how telemedicine (TM) is used in our protocols during the COVID-19 emergency.

Material and Methods

VDC in our department has been used as part of our rehabilitative methods for deaf patients for about 30 years. The fundamentals of our methodology include: early diagnosis of hearing loss; immediate application of hearing aids; living as though with normal hearing; family cooperation; individual rehabilitation; and full school integration. The cognitive prosthetic method is based on three key points: early diagnosis; application of a precise, personalised and variable in time prosthetic technology, which resolves the sensory deficit of discrimination and detection; rehab, focused on cognitive-linguistic aspects.

In our department, we treat paediatric and adult deaf patients. An early rehab allows us to take full advantage of the brain plasticity of the central nervous system, which is maximal during the first months of life.

The rehabilitative program is undertaken by patients with profound hearing loss, candidates for cochlear implant (CI) surgery, users of CI (post-surgical therapy), and children with severe hearing loss treated with hearing aids.

The rehabilitative program is managed by a speech therapist, and in children over two years, the speech therapist is supported by a pedagogist.

In our method, VDC is an integral part of the rehabilitative path, whereby sessions are divided into ambulatorial and home settings.

For this reason the cognitive prosthetic method gives parents a fundamental role. This is especially the case for mothers, as principal educator of the child and direct model for their language development. The mother becomes the key player in the rehabilitation path, with the help of a team of professionals that support her during her daily activities.

With this in mind, VDC is an available tool for monitoring the mother's ability to communicate. Over time, this feature became a core part of the method itself. VDC is also helpful with adult patients, as it provides their relatives with the correct communication strategies to use and helps them to learn auditory training methodologies.

At the start, VDC was introduced to reduce costs for families who had to reach Varese from other regions. Over the years, it proved to be an essential technological instrument for all patients i.e. not only those who were located a long distance away from the facility. The speech therapist teaches others how to communicate with deaf children and explains exercises for home therapy. The therapist monitors the mother and the patient through VDC, and can thereby guide the rehabilitative session. Control systems include: matching teachers to patients; and continuously monitoring school development and resolving scholastic problems with the use of hearing aids, CIs, or other devices implemented to treat hearing loss.

All patients signed a consent for VDC rehabilitation.

The tools necessary for VDC are: a computer with a camera and microphone; an internet connection; and Skype software. In the beginning, many families were dubious about the technology. Moreover, in the early days, some families did not have a PC or an internet connection. This latter issue has long been resolved now that such communication technology is very prevalent.

In March 2020, due to the COVID-19 emergencies, patients could no longer be treated in our service because a lockdown was initiated in Italy. We, therefore, proposed a solution for rehabilitative therapy in a smart-working setting using VDC. Senior management approval was sought and given for the smart-working modality of speech therapists and pedagogists, and all speech rehabilitation patients began to be treated at home.

In order to conduct VDCs, the IT department of the hospital had to create a secure connection that would allow therapists to access data and software from their home computers.

We identified three macro-areas: Northern Italy (Area A); Central Italy (Area B); Southern Italy (Area C). For the purpose of evaluation, patients were also divided into Children (< 18 years) and Adults groups. This division was made due to the different therapeutic methods used for these two groups (the parental-child approach used for children).

We prepared a VDC Patient Survey comprising thirty multiple-choice questions. The questionnaire could be compiled by the adult patient or by the child's parent who participated at the VDC.

105 questionnaires were sent through email or Skype to patients and deaf children's families during the period 20th to 24th of April 2020.

The survey was created to investigate the use of VDC, its characteristics, defects and merits.

After registering personal data and information concerning the prosthetic technology used, we analyzed the following areas: quality of the connection; instrumentation and technology used; and the role of videoconferencing in the rehabilitation path.

In this final area, participants were asked to set out: frequency, importance, and satisfaction in the use of VDC before and during the COVID-19 emergency; how comfortable they felt during the rehabilitation using VDC; a judgment upon the contribution that VDC gave in reaching the rehabilitation targets; their satisfaction and if they would appreciate the possibility to regulate prosthesis and implants remotely.

Data collected during the survey were analyzed through descriptive statistical analysis through Microsoft Corporation's Excel spreadsheets.

Results

The Audiovestibology Unit performed a total of 3328 VDCs per year until 2019. Children accounted for 88% of all VDCs. 33% of VDCs were completed with patient teachers.

During the COVID-19 emergency, ambulatory planning was totally transformed. Speech therapists and pedagogists undertook all rehabilitation training via VDC.

In the first two months of 2020, the total number of VDC was 80, or 12,8 per day. The distribution of the patients followed with video conference in Italy was:

- Area A 64 %
- Area B 14%
- Area C 22%

From March 2020, all rehabilitative sessions were performed at home with VDC.

In the period from the 1st March to 20th April, a total of 404 VDC rehabilitative sessions were completed. 93,8% (374) of all VDC involved children patients, with the remaining 6,2% (25) being adult patients. A total of 105 patients were followed using VDC.

Hardware and software problems, such as equipment management and absence of web signals, were found to be marginal and did not compromise the regular progress of the VDC.

We received 105 compiled questionnaires:

- 79% of all surveys were completed by mothers and 13% by adult patients.
- The age distribution of the patients who participated in the survey was: 52% under two years; 26% from 3 to 6 years; 20% were adults of over 18 years.
- 52% of all patients live in the same region as our hospital - the Lombardy region (table 1).
- 50% of patients used hearing aids and performed pre-CI rehabilitation, 43% were implanted patients and performed post-CI rehabilitation; 8% used bimodal stimulation.

Before the COVID-19 emergency, on average, three VDCs were carried out (5%) but

during the COVID-19 emergency, this figure increased to 22%.

The usefulness of VDC was well established before the COVID-19 crisis for 32% of patients, but during the pandemic this total increased; 78% of patients considered it essential. Of all the patients who responded to the questionnaires, only one patient thought that the VDC was not useful; 84% of patients think that the future of rehabilitation will be in combining hospital visits with VDC sessions. Table 1 sets out all the patients' answers.

Discussion

According to studies published in international literature, a growing number of patients are treated every year (from 1998 to 2008) with telerehabilitation techniques.

In our rehabilitative program, VDC is an integral part of speech therapy in both child and adult patients. The mother is a vital part of this method; our deaf children perform rehabilitation with their mother both in an ambulatory setting and at home. The mother is the natural speaker in language acquisition, our rehabilitative method takes advantage of this natural link. Most of our patients are 0-6 years (78%), and 79% of VDC therapy was performed with mothers.

After using VDC for some years, we realized that this technological innovation was a useful tool not just for monitoring and measuring improvements in young and adult patients, but also for supervising and correcting, when necessary, the communication style. In our experience patients followed-up via VDC reach the end of the rehabilitation process more rapidly.

Other advantages of video-conference are: monitoring rehabilitative improvements in children; adults and elderly patients; to control any problems with hearing aids; cochlear implants; earaches or other clinical symptoms. Indeed, all of the family may be involved in the rehabilitative program.

During COVID-19 emergency, the habitual use of VDC made it easy for our patients to accept a remote working approach - as made clear in the survey answers. Technical difficulties rarely compromised VDC therapy the majority of the time (69% of the time). In 57% of cases, users found it easy to use the

required technological instruments. Most patients considered VDC important before COVID-19 emergency (56%), and very important during the lockdown (75%). Further, VDC was deemed to be useful by 99% of all users.

The main reasons for this positive feedback were reviewed. In at least 60 surveys, it emerged that VDC was considered essential to: improving communication methods in everyday life (parent/child patient, caregiver/adult patient); the acquisition of new practical tools to stimulate the child/adult in everyday life; the immediate information and clarifications on the treatment path and the check of the rehabilitation results remotely.

Further significant advantages are: travel reduction (28%); and security of being able to get constant support at any time from the team (26%). Patients reported a reduction of human contact (48%) but said that they appreciated the continuity of care, despite restrictions due to COVID-19 emergency.

VDC is a useful instrument for teleconferencing with medical doctors, especially during the lockdown, when audiological evaluation in public health was only for urgent care.

Some answers have given us information to plan rehabilitative programs not only during emergencies but also during the progressive reopening periods. VDC is experienced by patients as an integral part of the rehabilitation

method, even in a post-infection era, they imagine rehabilitation in both hospital and videoconference.

Moreover, patients responded positively for remotely adjusting prostheses and implants in the future.

VDC is cost-effective, reduces travel time, reduces medical costs by increasing the number of patients treated in a single day or by a single professional unit, provides health service in rural areas and expands the rehabilitation opportunities by using computer-aided systems.

Conclusion

Telemedicine research may not be in complete accord; however, our research and experience of using this service leaves us no doubt that patients and families appreciate this method of healthcare delivery.

During recent years, VDC has shown to be an efficient and central tool for auditory rehabilitation.

The survey results support the vital role of VDC in our method, including the mother role in child patients rehabilitation.

The advantages of the VDC shared by patients can help us to program the therapeutic plan in the future.

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