Experiences of Telerehabilitation on Articulation Disorders for Children

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Abstract: We built a videophone-based speech teletherapy system through the internet and provided rehabilitation services for 2 children with articulation disorders, who lived in a remote area.

Introduction

Childhood articulation disorders are a type of communication disorder, which affects speech. Children with this disorder mispronounce words by omitting, distorting, substituting, or adding sounds. This is because it has been estimated miss-leaning on motion of pronunciations in development of speech.

Speech therapists (STs) provide rehabilitation services for individuals of all ages who have speech, language, and hearing disorders, including articulation disorders, which affect the ability to communicate with other people. There are more than 14,000 STs in Japan. However, patients in many remote regions do not have easy access to rehabilitation services for speech-language problems.

For treating patients in remote areas, telerehabilitation can be considered as an effective alternative. However, we need to investigate in a case-by-case manner whether telerehabilitation is as effective as face-to-face rehabilitation. Therefore, we administered videophone-based speech teletherapy for children who have articulation disorders. In this report, we discuss our experiences with such cases.

Method

Patients

The patients were 2 children (age, 5 and 6 years) who mispronounced Japanese sounds [s] or long “s” in International Phonetic Alphabet (IPA) (voiceless palato alveolar fricative: in English “[sh]e”) by substituting these sounds with other sounds (e.g., [k], [l], [l’s]). These children live in areas that have no rehabilitation services for childhood articulation disorders.
Equipments
We built a videophone-based speech teletherapy system delivered over a broadband internet connection. The system is described below.

Therapist’s PC
We set up a desktop personal computer (PC) with broadband connection; the PC was equipped with Windows OS, Skype, Real VNC viewer, and PacketiX VPN 2.0 client software, web camera, and headset microphone.

PC in the remote area
A note-type PC was installed at a nearby community health center with the same features as that of the therapist’s PC. In addition, a printer and loudspeaker were installed.

Software
We describe the role of the softwares that were installed in the PC.

Skype: This software establishes the video-phone connection. We can communicate interactively through voice and video. Moreover, we can send some files (text or photo etc.) as an attachment through this connection.

RealVNC: This software enables the operation of the PC in the remote area from the therapist’s PC. Therefore, once the patients switch on the PC, they need not further operate the PC.

PacketiX VPN 2.0: This software is used for establishing a virtual private network. We built a local area network virtually on the internet to increase the security in our system and to control the remote-area PC from the therapist’s PC.

Goal of the Therapy
The goal of this therapy was to help children pronounce these sounds correctly. At the end of the telerehabilitation sessions, the children were able to pronounce Japanese speech sounds [s] or long “s” correctly in their conversation.

Therapy Methods
Our teletherapy methods are similar to face-to-face therapy. During teletherapy, the children were taught exercises for correct motion of the articulatory organ (lip, tongue, etc); the execution of these actions was the goal of the first stage of the therapy. After the children achieve this goal, they continue to perform these exercises using phoneme, syllable, words, and sentences in their conversations.

We use various cues to correct the articulatory motion. In face-to-face therapy, these cues may be verbal or visual or tactile. However, in teletherapy, we could not use tactile cue. Therefore, first, we visited the patient and performed a face-to-face therapy session for correcting the
articulatory motion by using tactile cues. At the end of the first session, we taught the children’s parents and the community health-care nurse in that area to give tactile cues. From the second therapy session onwards, we performed teletherapy once in a week or once in 2 weeks. The frequency of these sessions was the same as that of face-to-face therapy.

Since children must exercise correct articulation repeatedly, the parents are encouraged to practice these exercises with the children at home everyday. We prepared the teaching material in text with photographs for home-exercises on the therapist’s PC; this material was then transmitted via Skype to the PC at the community center, where it was printed. All these operations were performed by the therapist from his/her PC.

Result

One child pronounced these sounds clearly after 12 teletherapy sessions, while the other child pronounced these sounds clearly after 21 sessions. The children were seated in front of the web-camera during the teletherapy sessions.

Conclusion

Duration of 2–6 months may be required to achieve the goal of correct pronunciation if the teletherapy session is conducted once in a week or once in 2 weeks. Moreover, we were able to give personal attention to the children during every session of teletherapy. The therapy outcome obtained in these cases suggests that telerehabilitation is as efficient as face-to-face rehabilitation. However, we studied only 2 cases. We will include more patients in our future studies.

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