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A study on website development to establish a telerehabilitation platform: a technical note.

GyuChang Lee, PT, PhD

Department of Physical Therapy, Kyungnam University, Changwon, Republic of Korea

Abstract

Background: It can be an alternative to providing medical services such as community-based rehabilitation using digital technology to communities and vulnerable groups experiencing a deficiency of skilled medical professionals. After the pandemic of COVID-19, online on-tact services have been used in numerous areas, and the demand for them is also increasing. However, in Korea, a telerehabilitation service is not implemented and there is no platform for telerehabilitation.

Design: Thus, this study aimed to establish a website as a starting point for building a telerehabilitation platform for vulnerable groups who are uncomfortable with movement. This is a technical note.

Methods and results: This is a technical note. This study developed a website that enables interaction between a client in need of rehabilitation and a rehabilitation professional. Through the website, the client and the telerehabilitation exercise prescription, and education service for a client.

Conclusion: Content development for the construction of the telerehabilitation platform and usability verification of the telerehabilitation platform are required through follow-up studies. It is needed to develop content for the construction of the telerehabilitation platform and to verify the usability of the telerehabilitation platform through follow-up studies. In addition, the privacy assessment and privacy by design should be reviewed to protect the sensitive information of clients to conduct future clinical

research.

Key words: Telerehabilitation, Digital platform, Community, Disable, Elderly

교신저자

이규창 교수
경상남도 창원시 마산합포구 경남대학교 7 물리치료학과

T: 055-249-2739, E: leegc76@kyungnam.ac.kr

I . Introduction

The World Health Organization estimates that more than one billion people worldwide have physical, psychological, visual, auditory, intellectual, learning, and cognitive disorders (World Health Organization & Bank, 2011). In particular, individuals with physical disorders are being managed mainly in a rehabilitation hospital, and intensive treatment and management are conducted by classifying the wards into the acute and subacute phases in Korea. On the other hand, there is a lack of adequate management plans for individuals in the chronic phase, who need continuous care after discharge, and individuals living in communities with markedly insufficient access to rehabilitation services (Jeong & Suh, 1999; Ko, 2010). These individuals have problems such as complaining of functional diseases and psychological anxiety due to the disconnection of rehabilitation services (Moon & Maxwell, 2004; Won, 2008).

One of the methods for resolving the aforementioned problems is to provide a telemedical service using digital technology (Kabir et al., 2021). Digital technology can provide limited medical infrastructure to groups or individuals in need of medical services with the development of information and communication technology (ICT), it can provide appropriate personalized services to individual characteristics (Ko, 2010). Thus, the importance of telerehabilitation is further emphasized because the individuals can take medical services remotely from the community or at home without directly visiting a medical institution (Dodakian et al., 2017; Moon & Maxwell, 2004). Since 2017, healthcare providers in the United States have already developed and implemented telerehabilitation programs for home rehabilitation training for stroke survivors (Fiani et al., 2020; Tinelli et al., 2017). On the other hand, despite the on-tact service being established due to the pandemic of COVID-19 in Korea, there is still a lack of an appropriate digital platform for social sympathy for the need for telerehabilitation for chronic phase individuals and the disabled.

Therefore, this study aims to develop and build a telerehabilitation platform for vulnerable groups who are uncomfortable with mobility in the community according to the social trend of online on-tact service. It was intended to provide a basis for individuals with reduced mobility can have rehabilitation services without directly visiting a medical institution.

II . Methods

1. Development of a website for telerehabilitation

This is a technical note. This study developed a website that enables interaction between a client in need of rehabilitation and a rehabilitation professional (Figure 1), and the URL address is zbbs.nrinfo.co.kr/web/. This website is widely used worldwide and based on the video conferencing platform Zoom, which does not require installation, real-time on-contact service is available, and it is also possible through zoom membership or Google login. The website

consists of a reservation function, a remote rehabilitation start function, and a function to view rehabilitation training contents for the establishment of remote rehabilitation. In addition, they can be checked various notifications and announcements on the service inquiry page, they can change personal information, and register inquiries on My Page.

The client can request telerehabilitation service at the desired date and time by clicking on ‘telerehabilitation reservation’, the first menu on the top left of the main homepage. The reservation date can be selected up to 3 months later, and the reservation time can be selected in 1-hour increments from 9:00 am to 5:00 pm on weekdays. Reservation is made when there is no service request from other clients, and a rehabilitation professional can provide telerehabilitation services at the appointment time requested by them.

The 'start telerehabilitation' button, the second menu on the top left of the main homepage, is implemented so that rehabilitation professionals and client can meet each other in real-time. They access the homepage at a pre-booked time and login, and when they click the corresponding button, they are connected to the Zoom platform and connected in real-time, non-face-to-face.

The third of the main menu, viewing the rehabilitation training contents, can be checked by clicking the ‘Today’s Rehabilitation Training’ button, which is a circular button located on the right from the top left of the main homepage. This function is linked by loading video content so that client can train themselves according to the exercise prescription received from a rehabilitation professional after real-time telerehabilitation is finished. It consisted that the posture, exercise method, and precautions of each exercise program.



Fig. 1. A website for telerehabilitation

The method of performing telerehabilitation using the website developed in this study is as follows. First, the client clicks the member registration icon at the top right of the main homepage to proceed with membership registration, and then decide on the desired telerehabilitation date and time for the client. At this time, by clicking the telerehabilitation reservation icon at the top left of the main homepage, book a date and time with the rehabilitation professional, a telerehabilitation appointment is completed unless otherwise booked by the rehabilitation professional in charge on that date and time.

III. Results

On the day of the reservation, the rehabilitation professional in charge will log in with the administrator account and check the client's information and call back to reconfirm the scheduled telerehabilitation participation on the day. If the client confirms their intention to participate, the client also logs in to their account and then clicks the 'Start Telerehabilitation' icon, which is the second menu on the top left of the main homepage. When on-tact between the rehabilitation profession and the client takes place online, the rehabilitation professional in charge will check the client's basic information, chief complaints, general health, etc. After that, a simple test is also performed on the client's movement of upper/lower limbs and trunk, and functional movements such as sitting, standing, and walking.

After that, the rehabilitation professional in charge prescribes an exercise suitable for the client/individual's body function level, and the exercise is performed under the supervision of a rehabilitation professional after education on the exercise method and precautions. About 40 minutes of real-time telerehabilitation is over, the rehabilitation professional asks the client to click 'Today's rehabilitation exercise', which is the third menu on the top left of the main homepage. And the client/individual can watch the recorded video of the exercise performed on the day so that they can repeat self-training.

IV. Discussion

In this study, the physical constraints of spatio-temporal were relieved for the vulnerable groups living in communities that do not have medical services efficiently due to the pandemic caused by COVID-19. In addition, we developed a website for telerehabilitation that provides relatively easy access to rehabilitation services. In the past, remote rehabilitation has received a lot of attention. There have been viewing-type remote rehabilitation through Youtube, smartphone-based remote rehabilitation, and non-face-to-face cyclical task training, but there is still no zoom format and recorded exercise remote rehabilitation based on the website (Manasco et al., 2010; Kim JS et al., 2018; Aily J et al., 2021)

The telerehabilitation website developed in this study consisted of telerehabilitation reservation, telerehabilitation start function, and rehabilitation training contents viewing function, and each function was performed sequentially so that the telerehabilitation service was made. A client who wants to have telerehabilitation can set up an appointment in advance with a rehabilitation professional through the reservation function. At the reserved date and time, the client and the rehabilitation professional access the website at the same time to communicate with each other. After a brief consultation and examination during one-on-one real-time connection, the rehabilitation professional prescribes an appropriate exercise to the client and provides training and demonstration on the exercise method. The client can perform the exercise together according to the feedback of the rehabilitation professional on the monitor. When the telerehabilitation time expires, training was made possible independently by re-watching the contents of the rehabilitation training video prescribed to the client.

In the current laws related to telemedicine in Korea, Article 34 of the Medical Act defines telerehabilitation as sup-

porting medical knowledge or technology to the patient in remote locations using information and communication technologies such as computers and video communications. In other words, in Korea, non-face-to-face telemedicine between doctors and patients has not been implemented yet. Moreover, there is no related law for telerehabilitation. However, in major developed countries such as the United States, Canada, and Australia, telemedicine and telerehabilitation have been implemented for a long time, and clinical studies on this are also being actively conducted (Dodakian et al., 2017, p.; Tousignant et al., 2015). In particular, in several previous studies related to the development of telerehabilitation services and platforms, telerehabilitation protocols and services specialized for each disease were also developed (Fiani et al., 2020; Rothgangel et al., 2017; Tinelli et al., 2017). However, in the previous recent studies conducted in Korea, there was no study on the development of a system and platform capable of performing telerehabilitation on the website itself; most of the studies focused on the effect of telerehabilitation exercise programs (Cha et al., 2018; Kim et al., 2020; Yun-Chan & Park, 2018).

Thus, this study is noteworthy in that it developed a telerehabilitation website for the first time in Korea based on Zoom, a non-face-to-face video conferencing platform. In addition, it will be possible to provide effective rehabilitation services to residents of rural areas, where access to medical care may be lacking due to locational and environmental constraints, through the use of this website. However, there is still insufficient content for telerehabilitation, various usability verification, and clinical research will be required to build a highly practical telerehabilitation platform. Thus, it is considered that research for supplementing and improving these aspects should be continued in the future.

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Reference

- Aily, J. B., de Almeida, A. C., de Noronha, M., & Mattiello, S. M. (2021). Effects of a periodized circuit training protocol delivered by telerehabilitation compared to face-to-face method for knee osteoarthritis: a protocol for a non-inferiority randomized controlled trial. *Trials*, 22(1), 1-15. <https://doi.org/10.1186/s13063-021-05856-8>.
- Cha, Y., Jung, B.-K., & Lee, S.-A. (2018). Effects of Participating in Tele-rehabilitation Service on Health Promotion and Quality of Life for Individuals with disability. *Korean Society for Rehabilitation of Persons with Disabilities*, 22, 169-188. <https://doi.org/10.16884/JRR.2018.22.3.169>
- Dodakian, L., McKenzie, A. L., Le, V., See, J., Pearson-Fuhrhop, K., Burke Quinlan, E., Zhou, R. J., Augsberger, R., Tran, X. A., Friedman, N., Reinkensmeyer, D. J., & Cramer, S. C. (2017). A Home-Based Telerehabilitation Program for Patients With Stroke. *Neurorehabilitation and Neural Repair*, 31(10-11), 923-933. <https://doi.org/10.1177/1545968317733818>
- Fiani, B., Siddiqi, I., Lee, S. C., & Dhillon, L. (2020). Telerehabilitation: Development, Application, and Need for Increased Usage in the COVID-19 Era for Patients with Spinal Pathology. *Cureus*, 12(9). <https://doi.org/10.7759/cureus.10563>
- Jeong, S.-H., & Suh, M.-J. (1999). The Need for Rehabilitation Day Care Program Service of Stroke Survivors. *The*
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- Korean Journal of Rehabilitation Nursing, 2(1), 29-44.
- Kabir, R., Jaleel, M., Bakhsh, H., Greenfield, D., Georgievna, V. A., Bulińska, A., Rai, J., Gonzales, A., & Hashmi, S. (2021). Should Healthcare Organisations Offer Ongoing Rehabilitation Services for Patients Undergoing Haematopoietic Cell Transplant? A Narrative Review. *International Journal of Health Governance*, 26(2), 114-134.
- Kim, J.-S., Yun, D., Kim, H. J., Ryu, H.-Y., Oh, J., & Kang, S.-M. (2018). Need assessment for smartphone-based cardiac telerehabilitation. *Healthcare Informatics Research*, 24(4), 283-291. <https://doi.org/10.4258/hir.2018.24.4.283>.
- Kim, J.-Y., leedongwoo, & Jeong, M.-B. (2020). Effect of a Telerehabilitation Exercise Program on the Gait, Knee function and Quality of life In Patients with Knee Osteoarthritis. *Journal of the Korean Society of Physical Medicine*, 15(1), 143-152. <https://doi.org/10.13066/kspm.2020.15.1.143>
- Ko, K. S. (2010). Current status and direction of welfare policy for people with disabilities. *J Korean Med Assoc*, 53(12), 1050-1052. <https://doi.org/10.5124/jkma.2010.53.12.1050>
- Manasco, M. H., Barone, N., & Brown, A. (2010). A role for YouTube in telerehabilitation. *International journal of telerehabilitation*, 2(2), 15. <https://doi.org/10.5195/ijt.2010.6050>
- Moon, B., & Maxwell, S. R. (2004). Assessing the correctional orientation of corrections officers in South Korea. *International Journal of Offender Therapy and Comparative Criminology*, 48(6), 729-743. <https://doi.org/10.1177/0306624X04266681>
- Rothgangel, A., Braun, S., Smeets, R., & Beurskens, A. (2017). Design and Development of a Telerehabilitation Platform for Patients With Phantom Limb Pain: A User-Centered Approach. *JMIR Rehabilitation and Assistive Technologies*, 4(1), e2. <https://doi.org/10.2196/rehab.6761>
- Tinelli, F., Cioni, G., & Purpura, G. (2017). Development and Implementation of a New Telerehabilitation System for Audiovisual Stimulation Training in Hemianopia. *Frontiers in Neurology*, 8, 621. <https://doi.org/10.3389/fneur.2017.00621>
- Tousignant, M., Moffet, H., Nadeau, S., Mérette, C., Boissy, P., Corriveau, H., Marquis, F., Cabana, F., Ranger, P., Belzile, É. L., & Dimentberg, R. (2015). Is telerehabilitation an adequate economic alternative to conventional rehabilitation? *Physiotherapy*, 101, e1528. <https://doi.org/10.1016/j.physio.2015.03.1516>
- Won, J.-I. (2008). Necessity of Community-Based Rehabilitation System after Stroke. *The Journal of the Korea Contents Association*, 8(1), 16-26. <https://doi.org/10.5392/JKCA.2008.8.1.016>
- World Health Organization, & Bank, W. (2011). Summary: World report on disability 2011 (WHO/NMH/VIP/11.01). World Health Organization. <https://apps.who.int/iris/handle/10665/70670>
- Yun-Chan, S., & Park, J.-H. (2018). Effects of Telerehabilitation on Motor Function of Stroke s: A Systematic Review. *Therapeutic Science for Rehabilitation*, 7(4), 7-18. <https://doi.org/10.22683/tsnr.2018.7.4.007>
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