Physical Dysfunctions and the Effectiveness of Adaptive Equipment: A Lending Library

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Introduction

In 2020, the Centers for Disease Control (CDC) found that one in four Americans in the United States have some sort of disability. Whether the disability is classified as mobility, cognition, independent living, hearing, vision, or self-care, 26% of adults have some type (CDC, 2020). According to the World Health Organization (WHO) one billion people need at least one assistive device globally. By 2030 it is estimated that at least two billion people will use an assistive device, while older populations will need two or more. Today, only one in ten people are able to gain access to needed assistive technologies (WHO, 2018). There is a large need for adaptive equipment globally that is not being met. WHO estimates that only 10% of those people who need these devices are able to gain access to it (WHO, 2018). This gap is due to high-quality assistive technology being financially expensive, limited state funding, and a lack of trained professionals with the use of assistive technology. New advances are being made to help decrease the gap that includes digital technology (Abdi, et al., 2021). Assistive devices are meant to aid those who will benefit from them and is something that should be easily available to those.

The purpose of this project was to develop and operate a lending library program that evaluates the efficacy of adapted equipment for people with physical dysfunctions. In the program, individuals were able to test out adapted equipment to see if they found it useful when completing their daily occupations. At completion of the trial time, they had the chance to buy the equipment for long-term use after testing it out for their own requirements. Occupational therapists (OT) value participation and engagement for their clients when completing their occupations. This means helping the individual have the necessary means to participate in activities that they desire to complete (AOTA, 2020). Below are images of commonly seen adaptive devices that were in the lending library.

Methods

This research was reviewed and approved in accordance with the University of Alabama at Birmingham's IRB procedures for research involving human subjects. Initially, a list of desired adaptive equipment for the durable medical equipment (DME) bank was provided by the site mentor. This included any type of adaptive equipment that the site mentor would like to have access to for clients that the facilities do not already possess or pieces that may not be commonly bought by clients. Once the DME bank was created, the sites were informed of what equipment is readily available for clients to access. When a client is recommended a piece of equipment, a contract was provided by the student that states the client will return the piece of equipment within a specific time limit provided by the site mentor. Once the time frame was complete, a concluding semi-structured interview was conducted by the student. This study used a qualitative, investigator developed, semi-structured interview. A semi-structured interview allows for open-ended questions for the interviewer to ask probing questions when necessary.

The first portion of the interview gathered demographic information that included the participants first name, age and condition/diagnosis. The next section obtained information about the environment the participant used the DME in. The last section gathered information about the participants' opinions on the equipment, including perceived pros and cons, likelihood of purchasing the device for long-term use, and any other opinions they would like to give

The sites that participated in the capstone project are multiple Therapy South locations in Trussville, AL and Birmingham, AL. The population for inclusion in this study were individuals currently in occupational therapy at the Therapy South locations. The participants are those with disabilities and/or injuries that benefited from the use of an adaptive device. There were no exclusions based on race, gender, age, religion, sexual orientation, or marital status. The intent was for at least 30 participants to partake in the DME bank for approximately four to eight weeks depending on the therapists' recommendation to allow for a variety of data to be collected. Verbal consent was be obtained from the participant if they chose to participate. Participation was voluntary and there were no consequences if an individual chose to not participate or quit.

Results

The first two questions on the survey gathered basic information on the client's condition/diagnosis and how this was affecting their participation in their activities of daily living. Participant one, acquired wrist fracture, was unable to form a composite following occupational therapy treatment. This caused for the candidate to experience difficulties maintaining grasp on small-handle utensils and self-care items. Participant two, essential tremors, has difficulty with participating in self-feeding tasks. With the tremors increasing as utensils neared the mouth, food was unable to maintain position on utensils. Participant three, radial nerve palsy, has difficulty completing daily activities such as lifting/carrying objects when cooking and cleaning.

Questions three through six collected data on the adaptive device the participant was using and the occupations they completed with it. Participant one utilized assorted foam tubing to complete meal preparation tasks. It was noted the adaptive equipment was most useful when modified to include cutting along the length of the tubing to fit around a variety of utensils. One of the features most enjoyed about the product was that it is adjustable due to being able to cut and adjust the length of the tubing. Another is that the tubing made items have a built-up handle allowing the user to maintain grasp on items when completing cooking tasks at home. Participant two trialed the weighted spoon and rocker knife with built-up handles to complete self-feeding tasks. Due to the tremoring, the equipment was not found useful for their needs. The candidate noted the benefit of the built-up handles and rocker knife feature, but neither piece helped to decrease the tremoring when self-feeding. Participant three trialed a mirror box and stated it was useful to be able to complete therapy exercises outside of the clinic.

Questions seven and eight asked the participants on their likeliness on purchasing the equipment for long-term use and if there was any more information they would like to share pertaining to the lending library. Participant one noted they would be purchasing assorted foam tubing. Also, the lending library was helpful to be given device suggestions and to trial that piece at home before purchasing. The trial allowed an informed decision to be made when purchasing the tubing since it was known it was helpful for the tasks completed at home. Participant two will not be purchasing the equipment pieces due to not benefiting when self-feeding. It was suggested that utensils with a hinge or swing edge may be more beneficial since the utensil would adjust with her tremoring. The candidate noted the library was useful to trial the utensils before purchasing to note if they helped with her tremoring. Participant three also will not be purchasing a mirror box due to progressing with their plan of care and no longer benefiting from the equipment.

Discussion

It was sought to create a lending library of adaptive equipment for those receiving hand therapy. This library decreased the financial burden for client's who could benefit from using durable medical equipment (DME) to complete their daily occupations outside of the clinical setting. It is essential to provide access to these services so that those with disabilities can take advantage of the lending library (Rayini, 2017).

Of the three participants, participant one chose to purchase the equipment trialed for long-term use. This was due to the foam tubing trialed being adaptable to multiple tools used throughout their home to include cooking items, self-care tools, and items used to complete desired hobbies such as sewing. Participant two trialed the weighted and built-up handle utensils with an essential tremor, but the tools did not allow the subject to complete self-feeding tasks easier than with normal utensils. It was noted during the initial visit that they found the feature on the spoon being turned towards their mouth useful in decreasing the space traveled from plate to mouth. Participant three trialed a mirror box and was able to increase exercise completion at home to progress further into their plan of care. Due to regaining function, participant three did not want to purchase the tool for long-term use. All three subjects had a common answer during the concluding interview which was that the lending library was helpful by allowing them to trial suggested equipment without monetary strain.

The project's outcome differed from the original design, but still maintained the purpose for which it was created. After completion of the concluding interviews, it can be identified that the adaptability of devices is a feature the participants found useful to their needs. Another is that the accessibility of the devices to TherapySouth clients created opportunity to trial different pieces while accommodating their individualized abilities. Lastly, education was provided to the therapists to include new devices they might not have been introduced to prior to the project. With more common and familiar devices, the education was limited to include a short synopsis on hinderances the equipment could assist with. These outcomes are discussed in greater detail in the following sections.

Discussion continued

The original design for the project allotted for at least 15 participants, and themes were planned to be created from the concluding interviews on the devices when used with certain injuries/conditions. Time was a limitation for completing the project with the original intent. While the project lasted 14 weeks, many clients throughout the TherapySouth locations in the Birmingham area did not have current needs that required use of DME outside of the clinical setting.

From this project, there were a few future research opportunities that arose. One of these research opportunities includes completing the lending library at a long-term care setting such as an inpatient facility or a skilled nursing facility. The client population at both proposed settings possess a different set of abilities that may benefit from similar equipment in the designed lending library. Using participants that have permanent loss of function or those who require a longer duration for their treatment period could possibly benefit more from the lending library equipment due to the devices aiding in completing their daily occupations. Another proposed research opportunity would be to expand the lending library to not only include hand injury equipment, but other physical disability aids such as walkers, canes, feeding equipment, and dressing aids. While if the current lending library included this supplemental equipment, it would not be appropriate to be completed at an outpatient hand therapy clinic. If implemented in a different setting, it would create more opportunities to include a diversity of participants with a variety of different conditions.

Conclusion

The original objective for the lending library was to gather data from at least 15 participants on their opinions of the effectiveness of devices when used with different hand conditions/injuries. It also aimed to ease the financial burden for client's due to not having to purchase equipment and having the ability to trial devices at home. With the time allotted to complete the project, only three participants enrolled in the project. From the concluding interviews, it can still be stated that the library was implemented successfully due to participants being able to trial devices at no cost. This project can be used as a steppingstone for future researchers to continue creating accessible DME for people without monetary costs. All devices in the lending library were donated to TherapySouth at the conclusion of the project duration to allow for future clients to have continued access to the items

References

Abdi, S., Kitsara, I., Hawley, M. S., & de Witte, L. P. (2021). Emerging technologies and their potential for generating new assistive technologies. *Assistive Technology, 33*(sup1), 17-26. https://doi.org/10/1080/10400435.2021.1945704

American Occupational Therapy Association. (2020). *Occupational Therapy Practice Framework: Domain & Process* (4th ed.). Bethesda, MD: AOTA Press.

Centers for Disease Control and Prevention. (2020). *Disability impacts all of us infographic.* Centers for Disease Control and Prevention. https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-imapcts-all.html

Rayini, J. (2017). Library and information services to the visually impaired persons. *Library Philosophy and Practice (e-journal).*

World Health Organization. (2018, May 18). *Assistive technology.* World Health Organization. https://www.who.int/news-room/fact-sheets/detail/assistive-technology

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