Future Advancements in Physical Therapy

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Physical therapy is a growing medical field that prioritizes direct patient interaction to help the patient overcome different varieties of injuries and pain. Therapists in the field perform examinations on patients, which they then use to develop a plan of care to promote movement, reduce pain, and prevent disabilities for patients (Huynh 2019). The profession is hands on, and the professionals work with other medical professionals to ensure each patient meets the goals set for them. Physical therapy offers an alternative to surgery in some cases, an expedited and efficient recovery from injuries and surgeries, and the field allows patients to not resort to pain medication to treat pain, thus reducing the chances of overusing drugs. Also, if surgeries and opioids can be avoided, then patients can save a substantial amount of money. The physical therapy field is growing so much because many people are experiencing pain in their everyday lives, which is evident as in 2016, when one out of every five Americans had chronic pain (Greenaway). The previous statistic suggests that in 2016, almost 65 million people suffered from chronic pain, so the need for physical therapist is only rising more and more each year, given that the population in the United States is still rising. Technology advancements will allow physical therapists to treat a greater number of patients more effectively.

Advancements:

Clearly, numerous people can benefit from physical therapy, but time and availability of physical therapists are limited to a smaller number of patients. The development of technology in the field will allow therapists to focus their time in areas that are more important, like coaching patients through exercises, rather than spending copious amounts of time doing repetitive tasks, like taking joint measurements and logging those measurements (Greenaway 2018). The physical therapy field can improve the lives of patients even more than before with new technological advancements.

There are most likely new inventions everyday that are making physical therapists jobs easier, while providing a more effective treatment for the patient. For example, Scott Rogoff, PT, DPT, ATC, with St Jude Medical Center in Fullerton, California, came up with a medical device to improve ankle rehabilitation because normal isometric machines or elastic bands can create an imbalance in the body by strengthening the calf instead of the ankle (Bullen 2017). By focusing on the ankle specifically, the device will strengthen the muscles surrounding the joint, thus preventing future risk of injury (Bullen 2017). Rogoff created the DART, the dynamic ankle rehabilitation trainer, which allows patients to perform isometric ankle strengthening exercises, and since 2013, the DART has been updated four times to improve its function (Bullen 2017). Devices, like the DART, allow therapists to treat patients with ankle injuries more effectively. The DART now has another function including biofeedback testing so physical therapists can be sure that the right target muscles are being utilized during exercises (Bullen 2017). There are many other devices that have been created and refined over the years to help better treat patients.

An example of refining an existing tool for more effective treatment comes from Bryce Taylor, PT, MSPT, and owner of Downtown Physical Therapy and Wellness in Indianapolis. After working with a number of patients “who were using stability balls to modernize lumbar stabilization protocols,” Taylor created the Halo Trainer (Bullen 2017). The Halo Trainer is a frame-like device, equipped with handlebars, which can attach to the stability balls to allow patients to be more stable when using the stability balls (Bullen 2017). This device has made a major impact in patient lives who use stability balls during rehab. Taylor also found that the Halo Trainer created new aspects to the stability ball, such as “combining core strengthening with strengthening of the shoulders, hips, and knees for more-integrated training” (Bullen 2017). Improvements to previous devices can offer new ways for patients to train, while working more muscle groups and joints at the same time. Future advancements in the field are being made as well, which could be revolutionary to physical therapy.

Image 1: *A halo trainer with stability ball and pump. From https://www.performancehealth.com/halo-trainer-with-stability-ball-pump*

Future Advancements:

The field of physical therapy is utilizing the fact that smartphones and tablets are a necessity in people’s everyday lives. Physical therapists have began integrating mobile apps into their treatment plans and patient interactions (Steinbach 2019). One

example of new mobile apps being used in the growing field is the PTGenie. This app is suggested to patients who wish to have more guidance while doing at home exercises (Steinbach 2019). Apps like PTGenie are useful for physical therapists because patients can continue treatment without going to see a therapist regularly. Other apps have been created to provide definitions of common terms in the field and effective orthopedic diagnosing tools while a patient is in the comfort of his or her home (Steinbach 2019). Steinbach continues on in the article by explaining other areas that are up and coming.

The next area in the field that research is advancing is in rehab robots. Robots are helping physical therapists who work with patients with cerebral palsy or ones recovering from strokes (Steinbach 2019). Physical therapy plays a crucial role in aiding the recovery of patients with the previous impairments because therapists help the patients gain mobility, strength, and comfort (Steinbach 2019). The robots can make treatments more effective for both the patients and the therapists. Robots have the ability to monitor the patients progress, thus allowing the robot to automatically increase or decrease the speed of an exercise as needed, so patients can accomplish more exercise repetitions per session (Steinbach 2019). Virtual reality technology is also changing the field for the better.

Image 2: A rehabilitation robot that helps paralyzed patients walk. From:https://www.washingtonpost.com/news/morningmix/wp/2017/06/10/robotics-are-helping-paralyzed-people-walk-again-but-the-price-tag-is-huge/

Virtual reality offers the ability for physical therapist to assign a wider variety of treatments for each patient. One system that is being used now is called CAREN. CAREN is a new virtual reality system that can help "the elderly, disabled, and those with traumatic injuries develop their mobility and balance" (Steinbach 2019). This CAREN tool is only scratching the surface of new physical therapy treatments. Another field that utilizes similar technology as virtual reality is Microsoft Kinect.

The Microsoft Kinect is normally connected to the gaming community, but it now being used in the field of physical therapy. This technology enables therapists and patients to interact without being in the same place (Steinbach 2019). The camera from the Kinect allows the therapists to easily monitor a patient's progress, performance, and form (Steinbach 2019). This device will allow the therapist to stay involved with a patient's rehab without having the patient come into the clinic everyday. The Kinect technology allows "patients to supplement in-person appointments and make sure their home exercise program is progressing as expected" (Steinbach 2019). Technology is improving patient treatment with every new development in the field.

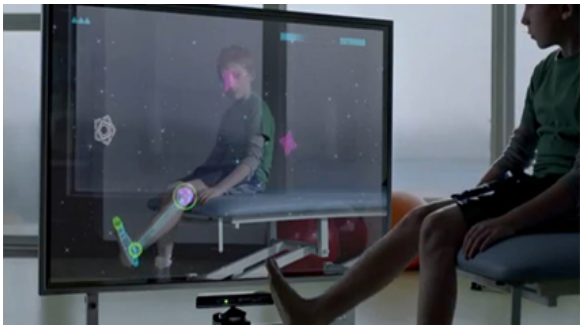

Image 3: A young boy using the Microsoft Kinect technology. From: http://x-tech.am/kinect-physical-therapy/

A future expansion of the Kinect technology is known as *ExerciseCheck*, which "is an interactive computer vision system that is sufficiently modular to work with different sources of human pose estimates, i.e., estimates from deep or traditional models that interpret RGB or RGB-D camera input" (Gu 2019). In other words, this computer system is an at-home treatment tracker and treatment guide. The Kinect technology uses RGB-D data, while *ExerciseCheck* uses RGB. The researchers found that the MS Kinect performed better than *ExerciseCheck* technology during treatment of patients suffering Parkinson's disease; however, has the ability to customize exercises, intake exercise information, evaluate a patient's performance, supply the patient and therapists with therapeutic feedback, and track the patient's progress throughout the treatment (Gu 2019). Although, *ExerciseCheck* is not the most efficient and effective computer vision system yet, it has great potential to help therapists and patients in the physical therapy field in the future.

As the physical therapy field expands, technology will become an essential part of each patient's treatment program. Technology allows therapists to treat patients faster and more effectively. Patient recovery time will be quicker because technology will help patients perform exercises at home, while tracking the patient's progress and keeping the patient motivated. At-home access to treatment for patients will expedite the recovery process because patients will not have to travel to a clinic for each therapy session. Patients will have access to instructions and feedback in the comfort of their own home. Technology is changing the physical

therapy field for the better. Robots and computer vision systems will help therapists treat their patients in the most effective way possible, not put them out of work, because the therapists will still be needed to program the robot or system and monitor the progress.

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