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Assistive Technology in the Life Care Plan

Chrissy Whiting-Madison, PhD, CRC
Sandra Bullins, MS, CRC
Melissa Jones Wilkins, PhD, CRC

As life care planners, we are tasked with the challenge of not only being familiar with multiple disabilities and their sequalae, but also with the latest trends in disability-related goods and services. With the explosion of hand-held technology in the last decade, staying abreast of emerging technology can be a daunting task. In this article, we introduce cutting-edge technology being researched for and used by people with disabilities. Inclusion of any of these items in the life care plan may be an inexpensive but effective way of improving the quality of life of individuals with disabilities.

Sandra's Story

As an individual who prided herself on being independent, the moment a piece of that independence was taken away was a shock. At the age of 22, I lost my sight due to a medical complication during surgery. Everyday tasks that I performed without thinking now took thought, planning, and an immense amount of concentration. I enjoyed cooking, reading, and corresponding with others via the internet. During this adjustment period, I had the opportunity to learn about devices and technologies that could eliminate the barriers placed in my way because of my visual impairment.

Since the onset of my blindness I have gotten back into the kitchen. Assistive technologies such as a battery-operated liquid level indicator prevent me from over filling a glass of tea or a cup of hot coffee; raised "bump dots" allow me to set the microwave, oven, and stove for the right temperature. The Job Access With Speech (JAWS) screen reading software has opened up the internet and electronic world. JAWS allows me to email, do research, post on social media, and has assisted me in earning a graduate degree. Currently, I use the Voice Over accessibility option on my IPhone to text, email, be present on social media, and read my beloved books. The National Library Service Talking Book program offered through the Library of Congress has an app that allows me to download talking books onto my phone for free just as someone could go and check out a book from the public library. I have also used an app that will allow me to snap a picture of a document, optimize it, and then read it to me. This app also has the capability to identify money using the same process.

Like for other individuals with disabilities, these technologies and devices have opened up my world and allowed me to regain the independence I thought was once lost. This article will explore some of the newest technologies and advances in the field that may help individuals with disabilities in their day-to-day lives as well as discuss how life care planners can incorporate the newest technologies into a life care plan.

Assistive Technology

Since the beginning of this millennium, assistive technology has made great leaps forward. Traditional devices and equipment have taken on new shapes, and have been given much needed makeovers. Past examples of such equipment and devices leaned more toward utilitarian function and did not give much credence to form. In an era where "bling is the thing," the current and future trends in assistive technologies are rapidly becoming stylish and hip.

The Centers for Disease Control and Prevention (CDC) estimates that 2.2 million individuals in the United States use a wheelchair for mobility and 6.5 million people use some other type of device to help with their mobility (cane, walker, crutches, etc.) (CDC, 2016). Since the age where a standard chair had wheels added so that someone with mobility problems could be moved more easily, the older standard version of the wheelchair has risen to new heights. New designs lift the individual from a seated position to a standing one, while other designs make all terrain travel ergonomically sound (Cooper, 2012; Office of Research and Development, 2016). To address a major safety concern for individuals who use wheelchairs, illuminated chairs allow the user to be seen and to see when in a dark location (Reznik, 2017). A light caster can be purchased for placement near the hubs of the chair starting at $21.00. There are also lights similar to headlights on a vehicle that can be placed on a wheelchair to light up the path. The Office of Research and Development (ORD) that is located within the U.S. Department of Veteran Affairs has worked towards newer innovations in wheelchair design. KD Smart Chair (2017) has concept wheelchairs that turn a manual chair into a motorized one with the addition of a device near the wheels. Other projected chairs include stair climbing chairs with a beginning price of $11,000, wheelchairs that can be moved with the turning of the head, and chairs that can be transitioned from a sitting position to a standing one with just a few movements of the arms and hands (Cooper, 2012; ORD, 2017; Reznik, 2017).

One area of assistive technology that may not always be linked to the perceived notion of what assistive technology should look like is that of prosthetic limbs (ORD, 2016). Traditional prosthetics were constructed for the specific

function they performed. Whether the prosthetic had an indistinguishable outer surface or metal frame, the precise purpose was to supplement the absence of the limb or body part (ORD, 2016). This, however, is not the case in the 21st century. From prosthetics covered in artwork to those that have an uncanny resemblance to a real hand or leg, form is alongside function. Prosthetic sleeves and skins come in a wide variety of designs, but can also be customized and personalized to fit the individual's mood and style. SleeveArt by Fred's Legs is one such provider of these artistic coverings, providing sleeves and skins ranging in price from $22 to $45. The coverings are made from a washable spandex which makes wearing outer clothing easier. Before, the traditional prosthetic surface would snag on pants and shirts, but now the silky material allows pants and shirts to slide with ease over the limb.

As there is advancement in medical science, progress is being made with the function of prosthetics. Dr. Todd Kuiken of the Rehabilitation Institute of Chicago has opened up an avenue that before, was only seen in the imagination and in science fiction. Dr. Kuiken has developed targeted muscle reinnervation (TMR) to use targeted muscle reinnervation where amputated nerves control healthy muscle elsewhere in the body (Marasco, Schultz, & Kuiken, 2009). The electric activity produced by the substitute muscle is harnessed to control the prosthetic limb (Marasco et al., 2009). Targeted muscle reinnervation begins with a consultation to determine if the individual is a good candidate for the surgery and procedure. The length of time from initial contact with the Rehabilitation Institute of Chicago to the completion of physical therapy and training is approximately one year, depending heavily on the progress of healing and retraining the relocated nerves. A portion of the cost can be supplemented by the individual's insurance provider. The cost of the customized prosthetic can range from $20,000 with basic function to approximately $100,000 that could have all the "bells and whistles" included. Further advancement in this area has the potential to restore a sense of touch by way of artificial limb (Mraz, 2014).

In early 2013, Google launched a new form of wearable technology. Project Google Glass was deemed to be the invention and innovation of the decade. Google Glass is a computer found in the form of eye glasses. From its inception, technicians and inventors have taken on this concept and broadened the possibilities. One such development is an app for the Google Glass that has the potential to eliminate or decrease the social inadequacies experienced by some individuals with disabilities. Stanford University is conducting research with one such disability, Autism Spectrum Disorder. Individuals with Autism Spectrum Disorder typically have difficulty in recognizing emotions or reading facial expressions on others (Weigelt, Koldewyn, & Canwisher, 2013). Researchers at Stanford are applying facial recognition software with Google Glass in a study of 100 children diagnosed with ASD. The glasses have a screen on the inside of the right lens. When the wearer is looking at the person he or she is with, the facial recognition software scans and then quickly matches the expressions. The inner screen then flashes the word associated, such as happy or sad and in some instances emojis are used. The hope is that wearable technology as the Autism Glass, will assist individuals with ASD to learn the social cues and increase social development. Currently the Autism Glass project is in phase 2 of research and development and not available for commercial purchase or download.

Life-Changing Apps for Persons with Disabilities

For the Blind and Visually Impaired

Apple's iPhone continues to release apps that work with voiceover, allowing access to the same social communities that are already enjoyed by those who are sighted. This list continues to grow with Apple's commitment to app equality between those with sight and those without. While still under development, the scientists at iVisit have designed an iPhone app that recognizes a variety of everyday objects. Although it is not a smart phone app, scientist Bruno Fosi has designed a Silicon iPhone touch case that provides tactile feedback. Tactile feedback, also called haptic feedback, allows for a visual glow, which is perfect for visually-impaired individuals who have retained an ability to distinguish between lit and unlit areas. Both of these aimed at providing a sense of sight to the visually impaired (Doughty, 2011; Wong, 2012).

For Children with Autism or other Developmental Delays

Apple once again leads the way in apps designed to work for children with autism or developmental delay. Proloquo2Go is a natural sounding text to speech app, which enables better communication for children with autism. An iPad that comes with Proloquo2Go will cost a consumer about $189.00. This program has given a voice to over 150,000 individuals by using symbols that translate into speech for the listener. IConverse, a more affordable option, costing only $9.99 to download the app, displays six unique icons that represent an individual's most basic needs. When activated by touch, the icons give both an auditory and visual illustration of the specific want or need. ICommunicate, costing about $50, is another app that develops a storyboard, which is an assortment of pictures that convey an idea or concept. It can also help design visual schedules, routines, flash cards, choice boards, and speech cards. Finally, iReward, costing $2.99, is intended to reinforce desirable behavior by providing motivation and a reward, such as a gold star or a new toy. IReward is especially useful when working with children (Doughty, 2011; Joshi, 2011; Pyper, 2011).

For Those Who are Deaf or Hearing Impaired

Tunewiki is a free app that works like closed captioning for radio. When a song plays on the radio, a small box at the

bottom of the screen shows the lyrics, line by line. Other apps, such as SoundAMP, Amplitude, and iHearClear can be used to amplify sound. For the price of $5, SoundAMP turns your phone into a hearing aid. It can even play back snippets of conversation Tivo-style. Amplitude, also popular among musicians, is a free app that allows you to record and play back conversations or music at a louder volume or with greater clarity. Ihearclear, costing $2.99, uses earbuds to enable its user to hear in difficult situations, such as situations with much background noise. These apps are designed solely to turn one's smart phone into a hearing aid, allowing them to clearly understand conversations or sounds that may have otherwise been lost.

IPhone users who are just learning American Sign Language can also learn over 800 words in ASL with iSign, costing $3.99. Another app that incorporates ASL into everyday living is Sign4Me, an app that provides an interpreter right in the palm of your hand (Doughty, 2011; Mann, 2003). Both of these apps provide an animated interpreter to allow communication between the hearing and non-hearing.

For Those with Dexterity Challenges

A unique version of the iPhone allows its user to shake the phone a number of times to dial the number desired. This app is perfect for individuals with arthritis or any conditions wherein it is challenging to press the small numbers and letters on a smartphone screen.

FluidTunes, another free app, gives the user control over the music on a smartphone using only a camera, and your hands, head, or feet. This allows the user to enjoy the music without once again having to access the small buttons and icons of a smartphone; instead they simply wave a hand to control the music on their smart phone (Doughty, 2011).

For Those with Diabetes

Glucose Buddy allows its users to monitor their blood sugar from the palm of their hands. Other apps that provide assistance with Diabetes management include: DiabetesLog, DiaMedic and GlucoseLog are also available to monitor blood sugar levels through charting (Doughty, 2011; Goyall & Cofazza, 2013; Mann, 2003). Glucose Buddy and DiabetesLog are both free apps, while DiaMedic and GlucoseLog are each available for $5.99.

Conclusion

These are just some of the newest technologies that are designed to promote independence for individuals with disabilities. Technology continues to grow and with this growth comes a paradigm shift for those who never imagined independence. Smartphone apps and other inexpensive technologies can be game changers in the disability world. Small things can greatly enhance the quality of life for individuals with disabilities, which is the goal of a life care planner. The costs of these recommended technologies could be allocated under an allowance in the Aids for Independent Function section of the life care plan.

As life care planners, we aim to stay up to date on technological advances in assistive technology. While we cannot be expected to be experts on everything, we can turn to resources such as websites, catalogues, and articles to keep informed. Some common websites that provide information on the latest technologies include: http://www.rehabtool.com/, http://assistivetechnology.about.com/, http://enablingdevices.com/, http://www.apple.com/accessibility/, and https://askjan.org/links/atoz.htm.

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About the authors: Chrissy Whiting-Madison received her Ph.D. in rehabilitation from the University of Arkansas. She currently serves as the clinical director at Sassin and Associates and adjunct faculty at Langston University, Roger State University and Tulsa Community College.

Sandra M. Bullins received her Masters degree in Rehabilitation Counseling from Mississippi State University. She currently serves as an independent Living Skills Specialist for Sources, Inc. She is currently pursuing her Ph.D. in Rehabilitation from the University of Arkansas.

Melissa Jones Wilkins received her doctorate from the University of Arkansas. She is currently a rehabilitation counselor for Owen Vocational Services and adjunct professor at Northwest Arkansas Community College. She has past experience as a rehabilitation counselor for Arkansas Rehabilitation Services at Arkansas Career Training Institute and as an adjunct professor at the College of the Ouachitas.