

CEU ARTICLE

NAVIGATING THE TRANSITION FROM MANUAL TO POWER MOBILITY

NRRTS is pleased to offer another CEU article. The following article is approved by NRRTS, as an accredited IACET provider, for .1 CEU (1 contact hour). After reading this article, please visit www.nrrts.org under continuing education to order the article. Upon passing the exam, you will be sent a CEU certificate.

Imagine yourself making plans to take a road trip to a new destination. While you've never been to the exact location, you have a basic understanding of what to expect and a few simple goals in mind for what you would like to accomplish. In preparation for the trip, you do your due diligence by updating your GPS app on your smartphone, envisioning an overview of the trip, researching the destination, checking over your vehicle, and packing all the essentials.

As you slide into the driver's seat ready to embark on the adventure and feeling completely prepared for what lies ahead, you enter the address of the destination into your GPS app only to realize there are many unexpected obstacles and options you had not previously considered. Should you select the route that is listed as the shortest, fastest, without tolls or the one that will allow you to avoid the interstates and drive the scenic back roads?

Just as you confidently decide on the route and crank the engine of your automobile, two passengers show up outside of your vehicle with luggage in hand and plans to join you as teammates on your trip. Suddenly you have an entirely different list of options to consider, all while still trying to reach your destination.

Have you ever noticed the similarities between the journeys of a road trip and the experiences had during the wheelchair provision process? As a clinician or rehabilitation technology supplier, from the moment you first hear the name and diagnosis of a new client, odds are high you are already mapping out a plan to help the client reach his or her destination. That individually tailored plan likely includes factors for achieving improved independence, health and overall quality of life. Even though the paths taken and experiences had throughout each client's journey may not be the same, the goals that the destination affords for all potential clients are likely similar.

This article will take a closer look at a variety of route options including benefits to each, potential roadblocks and considerations to keep in mind when the journey to improved independence, health and overall quality of life potentially requires a client to transition from a manual wheelchair to a power wheelchair.

FINAL DESTINATION EQUIPMENT OPTIONS

We live in a very techy world. In fact, odds are your smartphone is within arm's reach as you read this article. The latest and greatest gadgets for making everyday aspects of life more convenient and fun are constantly being sought by consumers. Home automation and having the world at our fingertips has transitioned from concepts dreamed up by the creators of Hanna Barbera's "The Jetsons" to what is expected by consumers today.

Canadian inventor, George Klein, is widely credited with initiating the design of the first electric motor powered wheelchair in the 1950s; however, there are some sources that report motors were first utilized in the development of mobility devices for individuals with physical disabilities in the early 1900s. Over the past several decades the innovation in power mobility systems has continued to evolve. From power add-on systems for a manual wheelchair to power wheelchairs with power seat functions driven via a miniature light-touch joystick controlled by the user's chin, the range of equipment options for power mobility is rather large.

POWER ASSIST AND POWER ADD-ON

Power assist and power add-on devices are commonly thought of as options to bridge the gap between a manual wheelchair and a power wheelchair. Power assist systems are designed to provide an individual who uses a manual wheelchair with an added boost of power while manually propelling a wheelchair. Some manual users report that power assist devices have decreased pain and fatigue while propelling their manual wheelchairs, thus positively impacting all areas of their life; however, the systems are not for everyone. There are different styles of power assist systems, all of which have distinct benefits and features to meet the needs of different users. The market currently includes a couple of frame

(CONTINUED ON PAGE 32)

NAVIGATING THE TRANSITION (CONTINUED FROM PAGE 30)

attachment methods. One example includes a separate component attached to the frame of the wheelchair, such as provided in the SmartDrive system from Max Mobility. Another example embeds motors in the rear wheels of a chair as in the case of the Quickie® Xtender™ (see Picture 1). The look, weight, size, assembly method and skills/abilities needed for basic operation of each system varies greatly.

A power add-on system allows the client to transform a manual wheelchair from only being moveable via manual propulsion from the user or a caregiver to being propelled by electric motors and operated by a joystick and/or alternative driving method. Similar to the power assist category of devices, there are a different varieties of power add-on systems. For example, some power add-on systems can be mounted on an ultra-lightweight wheelchair and use an independent setup with a standard joystick, while others use a tilt-in-space wheelchair operated via an alternative driving method.

Due to the variability in the systems, it is essential for a client to trial multiple power assist and power add-on systems prior to ordering one. As a part of the trial experience, it is highly recommended that the user be educated on not only the basic operation of the device, but also assembly/disassembly for transporting the system as such factors can often play a big role in determining a client-appropriate system. While the flexibility of transforming a manual wheelchair into a power mobility system might be appealing, the complete operation of the system may entail too many steps or simply not meet the need of the user and/or caregiver.

MOBILITY SCOOTERS

Scoters are personal mobility devices

most often utilized by people who have difficulty with ambulating or propelling a manual wheelchair long distances and who have minimal support needs. A client who may be considered appropriate to transition from a manual wheelchair to a scooter could be an individual with multiple sclerosis who only uses a manual wheelchair independently for short distances, but requires assistance from a caregiver for propulsion for long distances due to fatigue. Scooters are known for being driven via a handle bar/tiller style system and having only basic options such as style, color, portability and number of wheels (three or four). Scooters are not intended to be utilized by clients who cannot transfer onto the device independently or need complex seating support. In addition, scooters are not typically considered as easy to maneuver in tight spaces.

POWER WHEELCHAIRS

When the destination for a given client points in the direction of a power wheelchair, an entirely different world of options opens. Understanding the client's seating and positioning needs is an excellent starting point. Power wheelchair seating options range from Captain's style (see Picture 2) to custom molded with everything in between. In addition to the seating components (e.g., seat cushion, back, head support, lateral supports, positioning belts, etc.), the need for and type of seat functions should be assessed. A power wheelchair can be configured with seat functions such as tilt, recline, elevating leg rests and seat elevator. For more information on the clinical needs and recommended utilization of seat functions, it is suggested that you review the RESNA Position on the "Application of Tilt, Recline and Elevating Legrests for Wheelchairs Literature Update" (Dicianno, B. E., et al., 2015).

Power wheelchair drive wheel bases are available in three styles: rear-wheel, front-wheel and mid-wheel (see Picture 3). Each style of drive wheel base has benefits and drawbacks that can impact not only successful driving, but also the space required for maneuverability. In addition to the drive wheel position, consideration should also be given to other aspects of the power wheelchair base including suspension, size/footprint, lights and motors.

Another major category to consider in the selection of a power wheelchair involves the electronics and programmability. The electronics package on a power wheelchair can allow a client to use different driving methods, control external devices (computers, phones, tablets, televisions, etc.) and have independent access to power seating functions, including memory seating (see Picture 4). With the variety of options, styles and accessories available for power wheelchairs, a thorough evaluation should include the analysis of each component of the wheelchair to customize the most appropriate system to meet the needs and goals of the client. After all, our industry is called custom Complex Rehab Technology (CRT) for a reason.

GOALS VS. NEEDS: DO THESE ROUTES INTERSECT?

High tech innovative equipment is being developed at what seems like lightning fast speeds in the CRT world. This begs the question... If having the most high-tech and intelligent smartphone on the market is a status symbol of sorts, wouldn't having a super fancy power wheelchair with the latest and greatest gadgets to make life "easier" be more desirable than a lower tech alternative manual wheelchair? Not exactly. To unpack the idea of transitioning from a



PICTURE 1

Quickie Xtender Power Assist Device



PICTURE 2

Captain's style seating on Quickie Pulse

manual wheelchair to a power wheelchair, we must first consider why a client may need to consider making the shift to power.

Independent mobility can have a tremendous impact on the development and/or rehabilitation of learning, communication, mobility, socialization, recreation, vision and self-care (Anderson, D., et al., 2013). In addition, independent mobility can help maintain a quality of life and enhanced feelings of self-worth in the aging population that otherwise becomes dependent upon others (Pettersson, Tornquist, Ahlstrom, 2006; Brandt, Iwarsson, Stahl, 2004). Innovative technologies for wheelchairs are constantly coming onto the market and enabling individuals with a wide spectrum of abilities and limitations to become independent via wheeled mobility. Achieving independent mobility can vary greatly from one individual to another, which is why completing all steps of the evaluation process is so crucial.

EVERYONE HAS GOALS

Identifying the goals of the client and/or the caregiver should be a top priority early in the wheelchair provision process. The clinical needs and self-identified (or caregiver-identified) goals of the client may not always be in alignment. For example, a client who sustained an incomplete spinal cord injury at the sixth cervical spinal level (C6) and has been using an ultra-lightweight rigid frame manual wheelchair since the injury 18 years ago may simply want to obtain a new ultra-lightweight manual wheelchair similar to the one he has. However, due to reports of significant pain in his upper extremities and the impact this has on the client's everyday life, the clinical team believes the client is more appropriate for a power wheelchair. Another example is a 2-year-old

diagnosed with spinal muscular atrophy Type 2 who demonstrates strong potential for independent mobility through the utilization of a power wheelchair, but her parents are not sure if power mobility is a good idea. Instead, they believe their daughter needs to receive a dependent manual tilt-in-space wheelchair.

What about cases when a client and/or caregiver's desire for power mobility does not meet the client's true medical needs? A circumstance such as this may present itself when a caregiver expresses a goal to obtain a power mobility system because of difficulty pushing a fully dependent loved one who is in a wheelchair because of size. In situations such as this, it will be helpful to discuss medical necessity and examine the guidelines of funding approval to determine if funding from a third-party source is probable.

WHAT IS TRULY NEEDED AT THE FINAL DESTINATION?

As each of the clients move through the assessment stage of the wheelchair provision process, it will be essential for the entire evaluation team, including the client, family/caregivers, physical therapist, occupational therapist and rehabilitation technology supplier, to discuss the pros and cons of each of the route options that will lead to improved independence, health, and overall quality of life. There are numerous factors the entire team needs to take into consideration while navigating through the sometimes-arduous wheelchair provision process, especially when it relates to transitioning a client from a manual wheelchair to a power mobility system.

For an individual who has been propelling himself independently in a manual wheelchair, transitioning to a power wheelchair may be a necessity when facing physical hardships including injury and pain. There are some strategies a client can take, including proper equipment selection and set-up of the manual wheelchair, muscle strengthening protocols, and various additional precautions. Nonetheless, the upper extremities, especially the wrists, elbows and shoulders, can often be at significant risk for injury. The incidence

(CONTINUED ON PAGE 34)



NAVIGATING THE TRANSITION (CONTINUED FROM PAGE 33)

of injury to the shoulder is most likely since, while extremely mobile, it is not as strong or stable as the joints of the lower extremities, thus making the shoulder more vulnerable to developing musculoskeletal issues including impingement, tendinitis and rotator cuff tears (Hastings, J., et al. 2011). If the client reaches a point at which he can no longer propel himself in his wheelchair, complete activities of daily living, engage in desired leisure activities, perform required vocational responsibilities, and/or lead an overall healthy life without pain or at all, it is likely time for the treatment team to initiate the exploration of alternative routes for independent mobility including power mobility options.

Research supports theories surrounding the utilization of power mobility with babies as young as 7 months (Lynch, A., et al. 2009). Studies have also revealed independent mobility can have a significant impact on a child's overall development including areas such as cognition, communication, socialization, and mobility.

Programs such as "Go Baby Go" out of the University of Delaware have shined a light on evidenced based reasons that power mobility should be explored for young children and have also generated resources for creating power systems and training for treatment teams including therapists, rehabilitation technology suppliers, educators and families.

Even though there has been an increase in overall acceptance and understanding of the utilization of power mobility with young children among some professionals in the field of complex rehabilitation technology, embarking on the route of transitioning a young child from a manual wheeled mobility system, such as an adaptive stroller or wheelchair, can involve navigating a course just as

involved as transitioning an adult from an ultra-lightweight manual wheelchair to a power wheelchair.

The potential for an increase in other developmental areas may help tip the scale for caregivers in the direction of exploring power mobility for a young child, but transitioning older children and adolescents involves another set of factors to consider. Let's take, for example, a 17-year-old individual with cerebral palsy (CP) at Gross Motor Function and Classification System (GMFCS) level III who has historically utilized a manual wheelchair to propel short distances around home and at school and is preparing to attend college after graduating from high school. Transitioning from a manual wheelchair to a power wheelchair would potentially increase his ability to not only get across the college campus independently to attend required academic activities, but also could have a positive impact on his overall quality of life as he moves into living on his own and spreading his wings into adulthood by decreasing reliance on others.

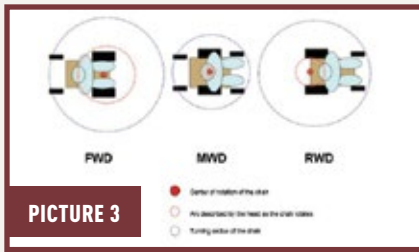
NAVIGATING THE BUMPS AND TWISTS ALONG THE WAY

Knowing the options available for power mobility and that a client needs to transition from a manual wheelchair to power mobility doesn't mean that you and the rest of your team members will be able to simply speed to the final destination of your recommendation. As you may recall reading earlier in this article, a client's needs do not always align with the client's and/or the caregiver's goals in relation to a wheelchair. There are numerous real life factors to consider and potential obstacles that may be lurking at every crossroad.

ACCEPTANCE OF NEED

The only constant in life is change; however, accepting the need for and navigating through change can be extremely difficult no matter the situation. A common perception among individuals who utilize wheelchairs is that a power wheelchair makes a person look more disabled. In a research study focused on self-esteem, function and quality of life of adults with low cervical spinal cord injuries, participants reported believing that people who utilize a manual wheelchair are more physically fit. The researchers conducting the study hypothesized that this belief likely manifests into other areas of life including better physical function, greater independence, an overall more active and social lifestyle, and ultimately, higher self-esteem (Hastings, J., et al. 2011). The belief that a power wheelchair will lead to the perception of looking more disabled has led to some clients choosing to remain in a dependent tilt-in-space wheelchair as opposed to learning to drive a power wheelchair that would provide independent mobility.

Accepting that a young child needs a wheelchair of any type, much less a power wheelchair, can be very difficult for a parent. Some parents are concerned about the perception of friends, family and society regarding their child's use of a wheelchair, as well as how this translates to the parents themselves. Most parents do not enter into parenthood with the expectation that their child will have a disability. As such, it is not surprising that accepting each aspect of an unplanned for reality, including the need for a wheelchair, requires some level of processing. From concerns about a child's ability to learn to drive a power wheelchair, to safety of the child and those around him, to the unknown impacts a power wheelchair may have on the child's development and well-being, the anxiety a parent may face when presented with



Captain's style seating on Quickie Pulse

PICTURE 3



Power Seating Functions on Quickie QM-7

PICTURE 4

the idea of transitioning a child from a manual mobility device can seem overwhelming.

Perceptions and personal beliefs are real and should be addressed with respect and support by the entire team. No matter if the client or caregiver is dealing with acceptance, as a member of the treatment team it is important that you address each concern in a supportive and fact-based way.

IMPACT ON DAILY LIFE

When first presented with the idea of transitioning to a power wheelchair, common responses include: “If I get a power wheelchair, my entire life is going to have to change;” “There is no way that thing is going to fit in my house;” “My son is going to gain a lot of weight and lose function;” and “Maintaining a power wheelchair is so much more work than my manual wheelchair.” The reality is many aspects of an individual’s life – and potentially the caregiver’s life – will be impacted, some of which may be negative and others that will be very positive.

TRANSPORTATION

Transporting a power mobility system is quite frequently the first barrier that comes to mind for clients and caregivers. Unfortunately, technology is not at the place where we simply push a button and our vehicles fold up into a small brief case like George’s did during the opening credits of “The Jetsons;” however, as discussed earlier in this article, there are power add-on options for manual wheelchairs that can be assembled and disassembled. These products may not be the

ideal solution or meet the client’s clinical needs, but exploring the possibility may be helpful.

If a full power wheelchair is required to meet the client’s clinical needs and the client desires/requires a personal vehicle, discuss the avenues for pursuing a wheelchair-accessible vehicle including resources for locating dealers, funding assistance (e.g. programs for veterans, specialized loans, etc.), customization ideas and driver training programs. As you talk through specific wheelchair options, review the securement options (as a passenger and driver), footprint and turning radius. Providing resources for local public transportation options such as buses, taxis, subway systems and wheelchair-accessible transport services would be helpful. In addition, providing accessibility information for long-range or specialized travel accommodations (e.g., airlines, cruise ships, trains, etc.) could be beneficial to the clients.

ARCHITECTURAL BARRIERS

An individual in a wheelchair typically designs and sets up every aspect of their home and work environment for success. If a person in a manual wheelchair is preparing to transition to a power wheelchair, ensuring he is still able to access his environments is crucial. While a wheelchair trialed in clinic may seem like the ultimate solution, if the person cannot get in and out of his home, then alternatives, whether it be the wheelchair or adaptations to the environment, need to be explored.

The home and office are just two places that architectural barriers may be encountered.

In cases when an individual is out in the community in her manual wheelchair and encounters a couple of unexpected stairs along the path of her peers, it may be feasible for her friends to bump her up the stairs with little impact on the evening out. However, a situation such as this is likely a different ballgame if the client is in a power wheelchair. Making the client aware that these situations will most definitely arise and talking through ways to potentially navigate them may be helpful. It may also be beneficial to provide resources such as apps or websites that are designed for users to learn about areas that are accessible. Many apps include a social media element built-in for user feedback on specific destinations.

OVERALL LEVEL OF FUNCTION

“If you provide him a power wheelchair he’s going to gain the freshman 50 as opposed to the freshman 15!” The potential of weight gain and decrease of overall level of function for the client is a very real fear of the individual using the manual wheelchair and his caregivers. There is research on both sides of the fence when it comes to reported activity levels of individuals who utilize manual wheelchairs versus those who use power wheelchairs. In one study, the participants who used manual wheelchairs were shown to have a higher level of physical function; however, the same study revealed that there was not a significant difference in the BMI (Body Mass Index) between the groups of manual and power wheelchair users (Hastings, J., et al. 2011).

(CONTINUED ON PAGE 36)

NAVIGATING THE TRANSITION (CONTINUED FROM PAGE 35)

Over the past five years, activity trackers have become the rage in the weight loss industry, and there are now options specifically for people who use wheelchairs. However, a person's decision to wear a fitness tracker doesn't mean she is going to magically move any more than she did prior to owning the device. Committing to an exercise program is essential for people of all ability levels. Fitness programs designed for people with physical disabilities are popping up all over the country, including hospitals providing gym memberships for discharged patients to return to the facility to utilize the adaptive equipment. Prior to recommending any program or activities to any client, it is important to involve the client's physician and clinical team.

In addition to the client's level of fitness and weight as it relates to transitioning to power mobility, it's also important to look at the client's level of function in other areas of life. Prior to transitioning from a manual wheelchair to a power mobility system, some users have experienced pain and injuries so significant that they can no longer perform responsibilities at work, tasks around the house, and/or previously enjoyed leisure and social activities. For some users, the utilization of a power mobility device has allowed them to resume personally valued responsibilities, interests, and roles. In addition, the user's ability to perform work-related and other tasks can be restored, thus increasing self-esteem and feelings of competence (Buning, M. E., Angelo, J. A., & Schmeler, M. R., 2001).

MAINTENANCE

Some degree of maintenance is required for all forms of technology including complex rehabilitation solutions. While in general manual wheelchairs may

require limited day-to-day maintenance as compared to the daily maintenance of a power wheelchair, no solution is truly maintenance free. Similar to the operation and basic care guidelines you provide to clients who utilize manual wheelchairs, it will be important to review operation and maintenance recommendations to individuals who use power mobility. It is beneficial to discuss the type of care needed for each of the power mobility options being considered for the client because there are pros and cons to all systems. Providing the best possible picture on the front end will likely decrease unexpected issues upon reaching the final destination of delivering the wheelchair.

Along the same line of maintenance, reviewing care and preventative maintenance suggestions for the client on his manual wheelchair even after delivery of a power wheelchair is recommended. Due to funding limitations, it is unlikely that a client will have the ability to get a back-up manual wheelchair. Therefore, prolonging the life of the current manual wheelchair is crucial in situations where transportation, access, or maintenance arise and having a back-up would be beneficial.

CONCLUSION

The journey from manual wheelchair to power mobility solution will involve uniquely planning a destination that is customized for each different client. The wide variety of equipment options, including power assist and/or power add-on devices, mobility scooters, and power wheelchairs with a host of potential features should all be considered as possible destinations. By effectively balancing the goals and needs of a client and his caregivers, meaningful guidance for selecting the best route for each different client can be offered. In addition, taking the time to address potential roadblocks such as acceptance of need and impact on daily life in areas including transportation, architectural barriers, level of function and/or maintenance can set up a client for success as he embarks on the exciting wheelchair provision voyage toward independence, health and overall quality of life.

CONTACT THE AUTHOR

Angie may be reached at Angie.Kiger@sunmed.com.

This article is sponsored by Sunrise Medical.

REFERENCES:

- ANDERSON, D., CAMPOS, J., WITHERINGTON, D., DAHL, A., RIVERA, M., HE, M., ... BARBUROTH, M. (2013). THE ROLE OF LOCOMOTION IN PSYCHOLOGICAL DEVELOPMENT. *FRONTIERS IN PSYCHOLOGY*, 4(JULY), 440.
- BRANDT A, IWARSSON S, STAHL A. OLDER PEOPLE'S USE OF POWERED WHEELCHAIRS FOR ACTIVITY AND PARTICIPATION. *J REHABIL MED* 2004; 36:70-77.
- BUNING, M. E., ANGELO, J. A., & SCHMELER, M. R. (2001). OCCUPATIONAL PERFORMANCE AND THE TRANSITION TO POWERED MOBILITY: A PILOT STUDY. *AMERICAN JOURNAL OF OCCUPATIONAL THERAPY*, 55(3), 339-344.
- DICIANNO, B. E., LIEBERMAN, J., SCHMELER, M. R., SOUZA, A. E., COOPER, R., LANGE, M., . . . JAN, Y. (2015). REHABILITATION ENGINEERING AND ASSISTIVE TECHNOLOGY SOCIETY OF NORTH AMERICA'S POSITION ON THE APPLICATION OF TILT, RECLINE, AND ELEVATING LEGRESTS FOR WHEELCHAIRS LITERATURE UPDATE. *ASSISTIVE TECHNOLOGY*, 27(3), 193-198.
- HASTINGS, J., ROBINS, H., GRIFFITHS, Y., & HAMILTON, C. (2011). THE DIFFERENCES IN SELF-ESTEEM, FUNCTION, AND PARTICIPATION BETWEEN ADULTS WITH LOW CERVICAL MOTOR TETRAPLEGIA WHO USE POWER OR MANUAL WHEELCHAIRS. *ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION*, 92(11), 1785-1788.
- JONES, M., MCEWEN, I., & NEAS, B. (2012) EFFECTS OF POWER WHEELCHAIRS ON THE DEVELOPMENT AND FUNCTION OF YOUNG CHILDREN WITH SEVERE MOTOR IMPAIRMENTS. *PEDIATRIC PHYSICAL THERAPY*, 131-140.
- LIVINGSTONE, R. & PALEG, G. (2014) PRACTICE CONSIDERATIONS FOR THE INTRODUCTION AND USE OF POWER MOBILITY FOR CHILDREN. *DEVELOPMENTAL MEDICINE AND CHILD NEUROLOGY*. VOLUME 56, ISSUE 3, PAGES 210 -221.
- LYNCH A, RYU JC, AGRAWAL S, GALLOWAY JC. POWER MOBILITY TRAINING FOR A 7-MONTH-OLD INFANT WITH SPINA BIFIDA. *PEDIATR PHYS THER*. 2009; 21: 362-8.
- PETTERSSON I, TORNUST K, AHLSTROM G. THE EFFECT OF AN OUTDOOR POWERED WHEELCHAIR ON ACTIVITY AND PARTICIPATION IN USERS WITH STROKE. *DISABIL REHABIL: ASSIST TECHNOL* 2006; 1:1-9.