

# CLINICAL CONSIDERATIONS FOR ALTERNATIVE ACCESS

When considering alternative access for a client, both client needs and equipment requirements must be addressed. The most challenging part of an evaluation is matching specific client parameters to equipment features. Before assessing a client for powered mobility, the following issues must be considered:

- Has the client had mobility and lost it and therefore had experience with mobility and motor planning?
- Has the client never been independently mobile and therefore has inexperience with motor planning?
- Does the client have fluctuating tone and/or impaired motor control?
- Does the client have muscle weakness and/or will have changing needs due to a progressive disorder?
- Does the client have only one access site consistently available to them?

It is really important to list all of the equipment you are going to need to have access to: mobility, seat functions [tilt, recline, elevate, legs], communication, computer, and control of the environment.

- Does the client need to access other assistive technology through the drive control, such as a communication device or a computer?
- How is the client going to change modes (i.e. from driving to tilting or communication)?

This is a lot to address at an evaluation, but we have to consider the life of a power chair being prescribed for the client, and for them to attain independence, they will need to have access to all of these functions. It is really important to list all of the equipment you are going to need to have access to: mobility, seat functions (tilt, recline, elevate, legs), communication, computer, and control of the environment. It is also very important for you to understand the program

options of the power wheelchairs you are prescribing so you can match them to the client's needs.

The starting place for a client who has had mobility and lost it and a client who has never had mobility will be completely different. With a client who has never had mobility, it is important to ensure their success and safety. Simply starting with one switch at a time to allow the client to feel movement and to understand going, stopping and being in control can be very helpful. Many clients with motor control problems struggle with an access method that is difficult, fatiguing and frustrating. For example, many clients with cerebral palsy using a joystick to drive

are not using it in a proportional way. Instead, they may use a very big gross motor movement to land on the joystick and be unable to control the movement enough to make it work proportionally, causing it to act like a digital switch anyway. These clients may also have a very difficult time with speed control, directional control and releasing the joystick quickly. This can be very dangerous and lead to a client not being considered a candidate for mobility. Frequently these clients are challenged with complex bodies, can be non-verbal, non-ambulatory and may have visual processing issues.

It is critical to have a configuration for access that is easily changeable so the individual will be able to start simply, learn at a safe pace and become competent in the use of powered mobility. For a client who has not had prior mobility experience, connecting all of this technology immediately could lead to failure. However, after they gain some experience with driving, other features can be enabled, such as power seating. The ability to connect this technology needs to be immediately available. With someone who does not have good control with their hands, is new to mobility and uses their head for access (like with a head array), all of the switches do not have to be connected from the beginning. This can help ensure the client gains confidence before requiring too much motor control from the start. When it is time to add external technology to the equation, like a communication device, the client will be more successful if they

have already had experience with mobility and with their device, so all we are teaching is how to change from driving to talking.

If someone lacks motor control, the activation should be as easy and sustainable as possible without having to use whole body or gross motor movements to activate a switch. I am a firm believer in using sensors (electronic switches that do not require force to activate) for clients who have to use prolonged switch activation or quickly repeat activation. I am almost always a proponent to using sensors, but



PHOTO 1 - SEAN AT HIS LAW SCHOOL



PHOTO 2 - TK FIBER OPTIC SWITCHES



PHOTO 3 - TK WITH ACCESS TO HIS LAPTOP

especially in these situations.

For successful outcomes and with today's programmable electronics, it is imperative the persons involved in the evaluation have a good understanding of the wheelchair electronics and its programmability especially for an alternative access user. If a client has never had mobility before and is trying a power chair for the first time with switch control, it is critical the chair responds to what the client is trying to do, but not in an uncontrolled way. The settings on a power chair that help the chair move when a switch is activated are accelerations and speeds. If you set the accelerations higher and the speeds lower, the chair will respond quickly, but move slowly. When a new user touches a switch the chair must respond so they can process that the movement was a response to what they did.

I would like you to meet Sean (*see Photo 1*). He has cerebral palsy and has been a head array user for almost 20 years. He is non-verbal and uses a communication device. It took a long time for his rehab team to create a complete system Sean could be independent with. Some of the considerations were that he lives alone, hires his own attendant care, needs access to a phone in case his help doesn't show up, and he was planning to attend law school so he also needed the ability to write and print a lot of school work. Sean now has three switches in his head array for directional control and the fourth on a swing away mount at his cheek that he uses to change modes on his chair so he can move between driving and his other access needs. His chair has two auxiliary modules that connect to his communication device, computer, phone and door opener. This system has truly helped Sean become independent. Sean attended college at the University of Texas and UT School of Law writing all of his papers on a computer with his head array and mouse emulator. Sean now has his own law practice in Dallas, Texas.

For clients with progressive disorders, the battle becomes fighting fatigue, which includes gravity and resistance of the access method itself. For persons with weakness or changing needs, the last resort is often scanning. For a client who is changing access methods, scanning is simple to understand, but adds time to every aspect of their life. If someone has lost the ability to use even an alternative light touch joystick, using fiber optic switches can be an answer. These switches are photoelectric and work off of reflection. They can be as small as a pencil lead and placed very close together (i.e. four switches can be placed in an area less than one inch). Fiber optics can also be mounted in several ways to accommodate an individual's movements. For example, on the side of a tray facing outward so the hand can rest off of the edge of the tray and a small finger contraction toward the switch can activate them. In the photo (*see Photo 2*), the switches are mounted underneath an armrest to provide both easy access for the client and protection for the switches. There are several other mounting options such as in a headset for cheek or lip activation. Fiber optics work well for persons with weakness because they require very little functional movement in a very small range.

I would like you to meet TK (*see Photo 3*) who lives in the greater New York area. He has spinal muscular atrophy (SMA) and has been using a custom fiber optic system for at least six years. TK has extreme weakness and he needed to be able to tilt himself for weight shifts and head control. He needed access to

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his laptop and desktop computers. TK now uses his fiber optic switches to drive his power chair, tilt himself and to emulate a mouse for his computers. TK uses a drive system that works with only two fiber optic switches due to his lack of functional movement. He covers the two fiber optics with his first two fingers to make the chair drive forward, when he moves to the left a small amount (covering only the left fiber optic switch) the chair will turn left and the same will occur when he moves



PHOTO 4 - NOEL'S LIGHT TOUCH JOYSTICK



PHOTO 5 - NOEL CONTROLLING DEVICES IN THE ENVIRONMENT

It is difficult to think about each piece of equipment the client will need for the life of their wheelchair, but it can mean the difference between independence and dependence on a caregiver if the components are not available for a client to be successful.

toward the right. His third switch is activated with his ring finger and acts as a mode change switch for his chair. When he activates this, the chair will go from driving forward to driving in reverse when the first two switches are covered. The next mode switch activation will allow the chair to tilt and the last activation will allow his fiber optic switches to become a mouse on his computer, which he does both wired and wirelessly for his two computers. This system has allowed TK to continue working and volunteering his time. After super storm Sandy, he helped people with disabilities in finding aid and shelter.

For clients who still have enough functional movement to operate proportional light touch short throw joysticks, there are still challenges that need to be considered. One hundred percent of the speed and wheelchair performance are contained in a much smaller area so controlling the chair can be much more of a challenge. In fact, finding exact forward can be difficult if the chair is not programmed correctly. If the accelerations are set too high, the chair can be very whippy and not feel controlled. As a result, speeds are often reduced when the forward and turn acceleration should actually be lowered instead. There are many settings that will affect the performance of the wheelchair and thus the outcome of an evaluation. Spending time with a power chair and a programmer before it is time for the evaluation is always the best practice. Another evaluation consideration is how the client will access a reset or mode switch so they can move from driving their chair to other functions. For someone with limited movement this can be a challenge.

I would like you to meet Noel (see Photos 4 and 5). He has muscular dystrophy and is a high school student. Noel needed to have access to his tilt for weight shifts and for postural control going down ramps, access to his computer for school work and emails, access to his home electronic aid to daily living (EADL) and to a PlayStation, the latter because he is a teenager. Noel uses a light touch short throw joystick, tilt and an auxiliary module, but could no longer access his reset switch as his weakness progressed. The joystick was modified so the reverse direction would instead be reset. Noel would not have to use another switch to change from driving to all of his other functions. Noel is able to access his EADL to change his TV to game input to then use his modified PlayStation controller so he can play Rock Band with his joystick through his wheelchair electronics.

When designing a system for alternative access there are many options that need to be considered. Understanding all of these options before starting the process of feature matching equipment will lead to a more successful outcome. It is difficult to think about each piece of equipment the client will need for the life of their wheelchair, but it can mean the difference between independence and dependence on a caregiver if the components are not available for a client to be successful. To have success it is imperative to involve the entire team, particularly involving and listening to the client to make the most appropriate recommendations. ➤

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