POWER MOBILITY OPTIONS FOR MUSCLE WEAKNESS

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Introductions
- Hi!
- Who I am
- Disclosure time
- Your goals

What we will be covering:
- Muscle Weakness
- Common diagnoses
- Clinical implications
- Power Mobility access options
- Case Studies

Diagnoses Characterized by Muscle weakness
- Muscular Dystrophies
  - Duchenne Muscular Dystrophy
  - Spinal Muscular Atrophies
  - ALS
  - Congenital Myopathies
  - Others

Duchenne Muscular Dystrophy
- Commonly cognitive involvement, as well
  - 70%
- Resistance to change
- Motor control often best midline and close to body

Spinal Muscular Atrophy
- Often our youngest drivers
- Type 1: very limited movement and strength for access
- Common access locations:
  - Bilateral thumb and index finger
  - Medial thigh (hip adduction)
### Amyotrophic Lateral Sclerosis
- Small percentage of people with ALS also have cognitive issues
- Palate issues
- Eye gaze and eye blink typically preserved longest

### Muscle Weakness
- Muscle weakness can be caused by different factors and is seen in a number of diagnoses
- Decreased strength means decreased active range of motion and force
- Often progressive

### Access methods
- Proportional
- Digital

### Joystick - hand
- Standard joystick often is or becomes too stiff to move and sustain in a deflected position
- Average force requirement 250 grams
- Average travel distance 28 mm

### Joystick placement
- Sometimes the problem is location…
- Most joysticks are mounted at the end of the armrest to one side of the wheelchair
- This position may not be where the client has the best control

### Swing away joystick mounts
- Manual
- Power
- Motion Concepts
Compact Joysticks
- Compact Joystick Single Switch, Dual Switch
- Other Remote or Compact Joysticks
- Easier to place midline and close to body
- Still stiffer than a mini proportional joystick
  - ASL
    - One switch on top of joystick acts as a Reset
    - Dual Switch: two switch jacks

Touch Pad
- Cellphone touchscreen technology
- Absolute Mode
  - Start in the center
- Relative Mode
  - Center is wherever you start
- Built-in mode switch on screen
  - On logo
  - Can enable or disable mode option

Mini proportional joysticks
- Reduced size, easier to mount in alternative locations
- Reduced range of movement required
- Reduced activation force
- Provide adequate UE support

Mini Proportional Joysticks
- ASL Extremity Control
  - 120g, 6mm
- ASL Micro Extremity Control
  - 18g, 13mm
- HMC/Permobil
  - 13g, 3mm
- Switch-It! Microguide
  - 25g, 6mm

Isometric joysticks
- Stealth Precision Mini Proportional
  - 43g
- Stealth/Mo-Vis
  - Multi Joystick
    - 50g, 8mm
  - Micro joystick
    - 10g, 3.3mm
- Switch-It! MicroPilot
  - 10-50g (adjustable)
- ASL Micro Mini
ASL or Switch It! Game Control Drive Control
• No joke!
• Controls power wheelchair, seat functions and mode changes
• Client can hold close in to body
• Light touch buttons
• Built in mini joysticks (40-50g)
• Durable!
• Cannot assign buttons in the field
• Great for clients with Duchenne MD

Questions?

Proportional Specific Parameters
• Sensitivity
• Short throw
• Changing Axes
• 3 Direction

Sensitivity
• How quickly the PWC responds to joystick movement
• Sometimes referred to as Tremor Dampening
• Too High: PWC drives too perky
• Too Low: PWC is unresponsive
• Switching to a mini proportional joystick?
  • Sensitivity may have to be reduced

Short Throw
• Shorter distance is required to achieve full speed
• If a client with muscle weakness is struggling with a standard joystick, increasing sensitivity and enabling short throw can help
  • May consider mini proportional joystick
• Use with caution with mini joysticks

Changing Axes
• Choose which joystick movement results in which directional movement
• i.e. Forward can be swapped with Reverse
• Allows the client to use their strongest direction of movement for Forward
3 Direction
- 3 directions can emulate 4
  - i.e. pulling back on the joystick can be Forward. Press Reset, now pulling back on the joystick controls Reverse.
  - If client has inadequate strength to move in one direction, use the other 3

i-Drive proportional programming
- On the i-Drive software, you can program features of the mini proportional joystick
  - Throw
  - Assign directions
  - Combine with switches
  - 3 directions

Questions?

Digital Access Methods
- Single switch scanning
- 2, 3, 4 or 5 switch combination
- Head Array (proximity)
- 4 switch proximity array
- 2 or 4 switch fiberoptic array
- Roll Talk

Switch Driving
- 1 switch: scanning
- 2 switch: Forward, Left, Right and Reverse and Reset
- 3 switch: Forward, Left, Right
- 4 switch: Forward, Left, Right and Reverse or Reset
- 5 switch: Forward, Left, Right, Reverse and Reset

So which do I choose?
- Optimally, we need 4 switch sites
- Reset is important as this allows control of other features through the driving method
- Minimize travel and force requirements
- Provide adequate postural support
Single Switch Scanning
- Clinical Indicators:
  - only 1-2 switch sites can be found
  - Client can see and monitor display
  - 4 or 8 direction control
  - Program scan pattern
  - Enable scanning of "Mode"
  - External scanner or on display

2 Switch Control
- If you can only identify 2 switch sites, the following options are available:
  - Q-Logic 2 switch control
  - Stealth iDrive Link function
  - ASL 2 switch fiberoptic array

2 Switch Control
- Q-Logic
  - Switch 1:
    - 2 activations = Forward, 1 activation = Left, double click = mode
  - Switch 2:
    - 2 activations = Reverse, 1 activation = Right

2 Switch Control
- Stealth iDrive: Link
  - Can program 2 switches to act like 3
  - Activate both switches for Forward, left switch for Left and right switch for Right
  - Come off switches to toggle Forward and Reverse
  - Reset
    - Double left activation
    - Or if client can use a 3rd switch, this can be Reset
  - Can use with mechanical and/or electrical switches

2 Switch Control
- An iDrive link with 2 proximities
  - On end of armpads

2 switch fiberoptic array
- Cover both beams for Forward
- Cover Left for left directional control
- Cover Right for right directional control
- 3rd switch can be used as reset
- Proportional version (ASL)
- ASL
- Stealth iDrive
Any 2, 3, 4 or 5 switch combination

- Clinical Indicators:
  - Ideally, 3 switch sites provides Forward, Left and Right directional control
  - If a 4th switch can be identified, Reset provides the most function
  - Requires interface box and switches
  - Most interface boxes only work with mechanical switches
  - iDrive allows electrical and/or mechanical switches to be combined

Switch Arrays

- Prearranged switch arrays
  -  Sip 'n puff
  -  Head array
  -  Proximity array
  -  Fiberoptic array

Sip 'n Puff

- Clinical Indicators:
  - Little control of head or extremity movement
  - Good oral motor control, lip closure, intact palate
  - Full directional control and speed control
  - Usually not indicated for this population
  - Insufficient strength
  - ALS – palate
  - Endurance

Head Array (proximity switches)

- 3-5 proximity switches in a tri-pad headrest
- Clinical Indicators:
  - Fair to good head control
  - Little extremity control

Stealth Head Array

- Suboccipital pad can increase stability of the head

Head Arrays

- ASL
- Switch-It!
- Stealth iDrive
- Total Control Head Array
- Permobil
Proximity switch arrays
- Typically placed under a tray
- Consider tactile cue above (i.e. loop Velcro)
- Consider pigtail cable
- ASL, Switch-It!, Stealth
- Clinical Indicators:
  - No force required
  - More travel is required than with fiberoptics

Fiberoptic Switch Arrays
- Small targets
- Accommodates very small movements with no force
- Typically placed by finger or thumb
- Cables are fragile
- ASL, Switch-It!, Stealth
- Calibration of activation distance
  - iDrive Tuning

4 switch fiberoptic array in tray
- Can mount in tray on superior surface or side
- Can mount in armtrough, as well
- Handpad with mini goosenecks

Eye Gaze
- Roll Talk
  - Allows driving with eye gaze
  - A single switch hit is still required to “wake up” system
  - Controls many other functions including communication and EADL functions
  - Primarily designed for clients with ALS

Questions?

Case Study
- Julian
- SMA, type 1
- Began using switches at age 2
- Access has changed over the years to meet his needs
Julian

- Combining switches
- Microslight, right medial knee, Right
- Fiberoptic, left thumb, Forward
- Proximities at either side of head for Left and Reset

Julian

- Invacare and ASL
- Julian could control Driving, Reverse, Tilt and Speed
- Custom made system by ASL

Julian

- As his needs changed, so have his switch locations and types
- Proximities by either side of his head
- Fiberoptics by each hand
- Fingers flexed to improve movement

Julian

- Left middle finger
- Right forefinger

Questions?
Thank You!

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