POWER MOBILITY OPTIONS FOR MUSCLE WEAKNESS

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Introductions

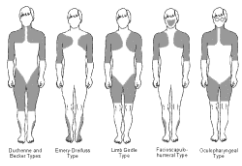
- Hi!
- Who I am
  - Disclosure time
- Your goals

What we will be covering:

- Muscle Weakness
- Common diagnoses
- Clinical implications
- Power Mobility access options
- Case Studies

Diagnoses Characterized by Muscle weakness

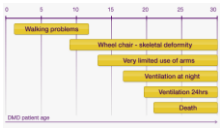
- Muscular Dystrophies
  - Duchenne Muscular Dystrophy
- Spinal Muscular Atrophies
- ALS
- Congenital Myopathies
- Others



Main areas of muscle weakness in different types of dystrophy

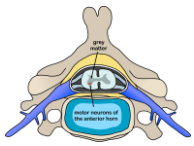
Duchenne Muscular Dystrophy

- 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)



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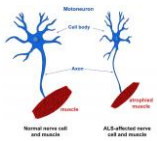
Amyotrophic Lateral Sclerosis

- Small percentage of people with ALS also have cognitive issues
- Palate issues
- Eye gaze and eye blink typically preserved longest



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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
- Decreased endurance
- Often progressive

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Access methods

- Proportional
- Digital

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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

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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

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Swing away joystick mounts

- Manual
- Power
  - Motion Concepts

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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

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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

Switch It!
Touch
Drive 2

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Mini proportional joysticks

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

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Mini Proportional Joysticks

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

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Mini Proportional Joysticks

- Stealth Precision Mini Proportional
  - 43g
- Stealth/Mo-Vis
  - Multi Joystick
    - 50g, 8mm
  - Micro joystick
    - 10g, 3.3mm

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Mini Proportional Joysticks

- Isometric joysticks
  - Switch It! MicroPilot
    - 10-50g (adjustable)
  - ASL Micro Mini

Ring mount

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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

Switch-It!
Drive Station

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Questions?

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Proportional Specific Parameters

- Sensitivity
- Short throw
- Changing Axes
- 3 Direction

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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

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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

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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

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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

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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 direction

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Questions?

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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

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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

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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

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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

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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

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2 Switch Control

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

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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

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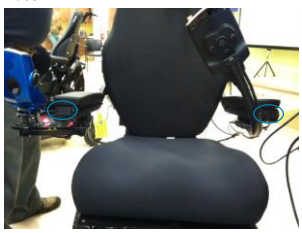
2 Switch Control

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



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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

Stealth

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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

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Switch Arrays

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

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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

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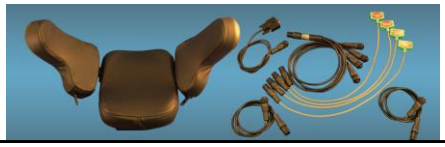
Head Array (proximity switches)

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

Switch-It!



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Stealth Head Array

- Suboccipital pad can increase stability of the head

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Head Arrays

- ASL
- Switch-It!
- Stealth iDrive
- Total Control Head Array
  - Permobil

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Proximity switch arrays

- Typically placed under a tray
- Consider tactile cue above (i.e. loop Velcro)
- Consider pigtail cable
- ASL, Switch-It!, Stealth
- Clinical Indictors:
  - No force required
  - More travel is required than with fiberoptics

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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

ASL

Switch-It!

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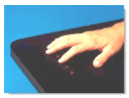
4 switch fiberoptic array in tray

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



Stealth

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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

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Questions?

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Case Study

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

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Julian

- Combining switches

Microlight, right medial knee, Right

Fiberoptic, left thumb, Forward

Proximities at either side of head for Left and Reset

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Julian

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

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Julian

- As his needs changed, so have his switch locations and types
- Proximities by either side of his head

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Julian

- Fiberoptics by each hand
- Fingers flexed to improve movement

Right forefinger

Left middle finger

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Julian

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Questions?

Thank You!

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