PEDiatric MOBILITY

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INTRODUCTION

Who am I?
Who are you?
Prior power wheelchair experience?
Your Goals?
WHAT WE WILL BE COVERING:

Importance of Early mobility
Determining and Developing Readiness
The Bases
Access Methods
Hands-on time!
Switch Assessment
Mobility Training
IMPORTANCE OF EARLY MOBILITY

Power Mobility is often not recommended for very young children due to:

- Concerns for motor development
- Concerns that the child will not understand or be unsafe
- Concerns about funding
YOUR TURN!

The team members I work with hesitate to recommend power because of:

- Concerns for motor development
- Concerns that the child will not understand or be unsafe
- Concerns about funding
IMPORTANCE OF EARLY MOBILITY

Early mobility has been linked through research to key developmental milestones.
IMPORTANCE OF EARLY MOBILITY

RESNA Pediatric Power Mobility Position Paper

- Compilation of expert opinion and summary of related research
- Intended for education, reimbursement and to direct research
- Available at www.atilange.com under Resources
A GREAT NEW RESOURCE:


- Literature Review
- Delphi consensus
- Clinical practice considerations

The following information is based on this publication
TYPICAL DEVELOPMENT

Crawling has a widespread and significant effect on children’s overall development

EMOTIONAL AND VISUAL PERCEPTUAL DEVELOPMENT

Use of a power mobility device triggers emotional and visual perceptual development

TYPICAL DEVELOPMENT

Children typically take independent steps and explore environment by 12 – 15 months
LEARNED HELPLESSNESS

Lack of purposeful movement and limited ability to affect environment can result in passive, dependent behavior

UNDER UTILIZATION

Power mobility continues to be underutilized

CONSENSUS STATEMENTS

With access to a specialized power mobility device, it is possible for infants with disabilities to have augmented mobility experiences as early as 8 months of age

CONSENSUS STATEMENTS

Children can begin learning to maneuver a power mobility device below 14 months of age and those able to use a joystick have demonstrated competent control as young as 18 to 24 months

CONSENSUS STATEMENTS

Children can begin learning to maneuver a power mobility device below 14 months of age and those able to use a joystick have demonstrated competent control as young as 18 to 24 months (cont.)

CONSENSUS STATEMENTS

For children with minimal mobility experience, a power mobility device can promote overall development as well as functional mobility

For children with minimal mobility experience, a power mobility device can promote overall development as well as functional mobility (cont.)

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CONSENSUS STATEMENTS

For children with minimal mobility experience, a power mobility device can promote overall development as well as functional mobility (cont.)

CONSENSUS STATEMENTS

For children with inefficient mobility, power mobility may enhance independence and participation in family, school, and community life

CONSENSUS STATEMENTS

There is no evidence that using power mobility at a young age impedes development of ambulation or other motor skills

CONSENSUS STATEMENTS

There is no evidence that using power mobility at a young age impedes development of ambulation or other motor skills, cont.

CONSENSUS STATEMENTS

Children with conditions that limit early functional mobility may benefit from power mobility to promote independence and support overall development

CONSENSUS STATEMENTS

Mobility experience in a power mobility device may support development of self-initiated behavior and learning

CONSENSUS STATEMENTS

Mobility experience in a power mobility device may support development of self-initiated behavior and learning, cont.

CONSENSUS STATEMENTS

Mobility experience in a power mobility device may support development of self-initiated behavior and learning, cont.

CONSENSUS STATEMENTS

Many children with severe intellectual and/or sensory impairments can learn to use a power mobility device competently with appropriate practice and environmental support

CONSENSUS STATEMENTS

Many children with severe intellectual and/or sensory impairments can learn to use a power mobility device competently with appropriate practice and environmental support, cont.

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Many children with severe intellectual and/or sensory impairments can learn to use a power mobility device competently with appropriate practice and environmental support, cont.

CONSENSUS STATEMENTS

Successful learning of power mobility skills may depend at least as much on practice time and quality of learning support within the child’s environment as the child’s motor, cognitive, or sensory abilities


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QUESTIONS?
DETERMINING READINESS

Motor Readiness
- Access Method

Cognitive Readiness

Are you ready?
DETERMINING MOTOR READINESS

Can the student access a joystick?

- Directional control
- Timed and consistent release
- Joystick use requires grading of the force and distance of movement
- We will cover access methods further in two future webinars
DETERMINING MOTOR READINESS

Can the student access at least 3 switches volitionally?

- Any switch locations
- Any switch types
- Sustained contact
- Timed and consistent release
DETERMINING COGNITIVE READINESS

Varied opinions out there
Nothing validated yet

Criteria used by The Children’s Hospital in Denver for over 5 years with approximately 200 children

- Goal: to objectify evaluations and provide a starting point for training
POWER MOBILITY CRITERIA

See Criteria handout
- www.atilange.com, under Resources

Cause and effect
Stop and go concepts
Directional concepts
Judgment
Problem solving
Following directions
and ... Motivation
CAUSE AND EFFECT CONCEPTS

The client realizes that activating the access method is causing movement of the power wheelchair

Measure: verbal or non-verbal expression
STOP AND GO CONCEPTS

The client realizes that activating the access method is moving the power wheelchair and that releasing the access method stops that movement.

Measure: verbal, following directions to Stop and Go or stopping for obstacles. Does not require accuracy.
DIRECTIONAL CONCEPTS

The client realizes that the power wheelchair will move in different directions, depending on how the access method is used.

Measure: the client responds verbally or non-verbally to different movement caused by different input or attempts to move to a location using different directional commands.
JUDGMENT

The client demonstrates developmentally appropriate judgment

Measures:
- the client recognizes obstacles and attempts to avoid
- the client is not aggressive
- The client demonstrates caution
PROBLEM SOLVING

The client demonstrates developmentally appropriate problem solving during driving

Measure: the client will maneuver the power wheelchair to a designated destination without cues
FOLLOWING DIRECTIONS

The client demonstrates the ability to follow directions while driving

Measure: the client will follow directions such as Stop, Go and Come Here
MOTIVATION

Motivation is important, too
YOUR TURN!

Do you use any form of screening tool in your setting?
- Yes
- No
- No, but I think we should
DEVELOPING MOTOR SKILLS

Joystick control

Switch control
- Sustained contact
- Timed release
DEVELOPING MOTOR SKILLS

Joystick Control

- Joystick Mouse
- Computer Software
  - i.e. painting program
- This doesn’t translate over very well to learning how to move a power wheelchair through space, but does develop motor skills
DEVELOPING MOTOR SKILLS

Sustained switch contact is required to continue movement of the power wheelchair.

Latch on a power wheelchair can be used in Forward and sometimes Reverse.

- Safety issues with children
SUSTAINED SWITCH CONTACT

Switch Toys and other Battery Operated Devices
- Direct connection with battery interrupter or pre-adapted device
SUSTAINED SWITCH CONTACT

Switch Toys and other Battery Operated Devices

- Working with a toy that moves around a lot? Try out the AbleNet Wireless Jellybeamer
SUSTAINED SWITCH CONTACT

Switch Toys and other Battery Operated Devices

- AbleNet Series adaptor can be used to develop sustained switch contact with more than one hand or other switch site
  - Forward and Left or Right can be combined for a diagonal movement
SUSTAINED SWITCH CONTACT

Direct Mode on AbleNet PowerLink 4

- Provides practice sustaining switch contact with electrical devices
- Two switch mode allows development of sustained two hand skills
DEVELOPING MOTOR SKILLS

Switch Release for accurate stopping

- Start developing activities or games to encourage the child to release the switch at a specific time
- i.e. connect a train set to the PowerLink. Encourage the child to stop the train at a certain location.
DEVELOPING COGNITIVE SKILLS

Cause and Effect
Stop and Go
Directional Concepts
Problem Solving

= Pre-mobility training
TWO METHODS

Method #1: Use Basic EADLs to develop specific cognitive skills

Method #2: Use dependent mobility base to “simulate” movement of a power wheelchair

Use both to increase learning!
DEVELOPING COGNITIVE CONCEPTS

Cause and Effect: Method #1

- Switch Toys
- PowerLink 4 in Direct Mode
DEVELOPING COGNITIVE CONCEPTS

Differentiated Cause and Effect: Method #1

- Switch Toys with AbleNet Dual Switch Latch and Timer (SLAT)
- PowerLink 4 with two devices in Direct Mode or Timed
DEVELOPING COGNITIVE CONCEPTS

Stop and Go: Method #1

- Switch Toys, Direct connection
- PowerLink in Direct Mode
- Single SLAT in Latch Mode
- PowerLink in Latch Mode
DEVELOPING COGNITIVE CONCEPTS

Stop and Go: Method #2

If the child is in an adaptive stroller or manual wheelchair...

- Place a switch where the client can access it
- When the child presses the switch, push the mobility base
- When the child releases the switch, stop pushing
DEVELOPING COGNITIVE CONCEPTS

Stop and Go: Method #2

- Verbalize Stop and Go when pushing the mobility base, driving the car, etc.
- Play Red Light, Green Light
DEVELOPING COGNITIVE CONCEPTS

Directional Concepts: Method #1

- 3 switches, 3 devices
  - Reinforces that each switch has a different function
DEVELOPING COGNITIVE CONCEPTS

Directional Concepts: Method #2

Place 3 switches where the child can access them

- Tell the child how this works
- Move the chair in the corresponding direction when the child activates a switch

![Switches](image.png)
DEVELOPING COGNITIVE CONCEPTS

Directional Concepts: Method #2

- Verbalize direction of movement while pushing the mobility base or driving the car
- Play Follow the Leader
DEVELOPING COGNITIVE CONCEPTS

Problem Solving: Method #1

Choice SLAT

- The first switch activates one device. The second switch and device will not activate until the first device is done.
- Client has to determine which switch to hit and when
DEVELOPING COGNITIVE CONCEPTS

Problem Solving: Method #2

Place 3 switches where the child can activate them
- Tell them how this works
- When the child activates a switch, move the mobility base in the corresponding direction
- Encourage them to “drive” to a specific location
DEVELOPING COGNITIVE CONCEPTS

Problem Solving: Method #2

- Allow the child time to explore
- Play Hide and Seek
YOUR TURN!

Do you use strategies to develop motor skills and cognitive concepts before a power wheelchair assessment?

- Yes
- No
- No, but I want to!
TAKE HOME MESSAGE:

Some kids hop in a power wheelchair and start driving immediately.

Other children need time and training to develop the skills required prior to a power wheelchair assessment.

Many strategies can be used to determine and develop readiness.
QUESTIONS?
THE POWER WHEELCHAIR BASES
PEDIATRIC POWER WHEELCHAIRS

ASL Tiger Cub
Invacare TDX Spree
Otto Bock Skippi
Permobil K300 PS Jr, 450 MX, Koala, M300 PS Jr
Quantum Q610, Q6000Z
Quickie QM710
Innovation in Motion Frontier
ADULT POWER WHEELCHAIRS

Many adult wheelchairs fit older children and teens

Some of the new MWD bases have smaller turning radius’ than some pediatric bases
BASE ELECTRONICS

Invacare Dynamic
- MK6i

PG Drives Technology
- R-net, Omni
- Permobil, Quickie, Otto Bock

Quantum
- Q-Logic
ASL POWER CUB

Scaled down Invacare Power Tiger

12 ½ inch seat to floor height

60 lb weight limit
ASL CUB VS. INVACARE TIGER

Sittin' Pretty in Texas
November 12, 2007
INVACARE TDX SPREE

MK6i electronics
Manual tilt
12-16 width
12-18 depth
INVACARE TDX SPREE WITH FORMULA CG

5” elevation

Power tilt
Grows with child
Optional power or manual tilt
Optional recline
Disassembles for transport
PERMOBIL K300 PS JR.

FWD
Power seat elevator
Power tilt
R-net electronics
11-16 width
10-18 depth
PERMOBIL K450 MX

Replaced the Robo Seat elevator
Tilt (45 degrees)
Seat to floor
10-18” depth
10-16” width
PERMOBIL KOALA MINIFLEX

Power seat elevator
- 8"

Power tilt in space
- 10 degrees posterior
- 6 degrees anterior

Optional bumper

Seat to floor 15"
10x10 through 14x14
PERMOBIL M300 PS JR.

11-16” seat width
10-18” seat depth
17” seat to floor
Power Tilt, Elevator options
Q6 EDGE FOR KIDS

New pediatric version
MWD

QLogic

Synergy seating allows 10-20 seat depth and width

Optional Power Tilt and/or Recline

QUANTUM Q610
QUANTUM 6000Z

MWD
QLogic
Synergy seating allows 10-24 seat depth and width
Optional Power Tilt
QUICKIE QM-710

R-net electronics
Power tilt option
12-22” seat width
12-22” seat depth
Optional Power Tilt, Elevate
INNOVATION IN MOTION

V6 Frontier super compact

- 50 degree tilt
- 150 recline with low shear
- ELRs
- 12” Seat elevator
- Dynamic electronics
QUESTIONS?
BREAK TIME

Please be back in 15 minutes!
THE ACCESS METHODS
ACCESS METHODS: PROPORTIONAL

Also called Analog

Joysticks
- hand
- chin
- head
- forearm
- foot

handle types
JOYSTICK - HAND

Proportional joystick control requires grading of force and distance of movement.
Grading requires co-contraction of the flexors and extensors.
Difficult for clients with abnormal muscle tone.
YOUR TURN!

What Alternative Proportional Joysticks have you used?

- mini proportional
- touch pads
- game control
- Magitek
COMPACT JOYSTICK
Compact Joystick Single Switch
Textured for easier grasp
Top is non-removable
One switch on top of joystick acts as a Reset
COMPACT JOYSTICK

Compact Joystick Dual Switch

Two switches on top of joystick send signals thru 2 switch jacks

- Reset
- Tilt
- Power
- Mouse clicks
- 1-2 switch SGD access
COMPACT JOYSTICKS

Who would you use these with?
TOUGH JOYSTICK

Switched joystick
4 or 8 directions

Heavy Duty to withstand significant forces
- Significant force may mean decreased control
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
TOUCH PAD

TD 2 mounting option
TOUCH PAD

TD Max

Switch-It!

Capacity surface

Assign where each “switch” is located
- Can change size of “switch” area

Proportional mode
- Absolute or relative modes
TOUCH PAD

Large surface
Can accommodate fist
Durable
TOUCHLESS FINGER JOYSTICK

HMC
Proportional Control
Fiberoptic Light
Accommodates limited strength and active range
CHIN JOYSTICK

Can be mounted on a swing away arm or bib
Can lead to repetitive stress injuries of the jaw or cervical area
Can be difficult to use if surface isn’t smooth
CHIN JOYSTICK – MOUNTING

Aluminum collar
CHIN JOYSTICK – MOUNTING
Collar mount or bib
CHIN JOYSTICK – MOUNTING

Swing-away bar
PROPORTIONAL MINI JOYSTICK

14g force

Standard Joystick
- 180 – 220 grams

HMC
HMC JOYSTICK: MOUNTING
MINI PROPORTIONAL JOYSTICK

Micro Extremity Control (MEC)
Slide switch makes Reverse Reset
Pushing down also acts as Reset
17 grams of force
New version has shorter throw and a lighter spring
MEC JOYSTICK - MOUNTING
MINI PROPORTIONAL JOYSTICK

Switch It! MicroPilot
Isometric joystick
Requires very little throw
Relies on force instead, approximately 10 - 50 grams
- Adjustable force
MICROPILOT - MOUNTING
MICROPILOT - MOUNTING

Mounted with fiberoptic reset

Mounted parallel to floor
MICROGUIDE

Switch-It
Non-isometric
25g force
POWER OPTIONS – MOVIE TIME!

Power swing away
Motion Concepts
Joystick
Sip ‘n Puff
Any control by mount
hydration
MINI PROPORTIONAL JOYSTICK

ASL Micro Mini Joystick
Isometric joystick
Mounted in a tray or contained in a box 1” square and ½” high
ASL MICRO MINI JOYSTICK

Mounting Idea:

Active Controls
MINI PROPORTIONAL JOYSTICK

ASL Touch Point Joystick
Proportional switch control
More pressure increases speed
Switches are diameter of pencil eraser
Can be placed in any configuration
Can also use as non-proportional
MINI PROPORTIONAL JOYSTICKS

Clinical Indicators:

- Requires small travel distance
- Requires minimal force to move and sustain joystick
- Can be fragile
- MEC includes reset (push downward)
YOUR TURN!

Who are you using Mini Proportional Joysticks with?

- ALS
- Duchenne MD
- SMA
- SCI
ASL OR SWITCH IT! GAME CONTROL DRIVE CONTROL

No joke!
Controls power wheelchair, seat functions and mode changes

Switch-It!
Drive Station
GAME CONTROL DRIVE CONTROL

Client can hold close in to body
Light touch buttons
Built-in mini joysticks
Durable!
Cannot assign buttons in the field
Great for clients with Duchenne Muscular Dystrophy
40-50 grams on joysticks
MUSHROOM JOYSTICK

Designed for clients who cannot grasp a joystick handle

Stiff

Alternative:
- Bodypoint dome handle
- Textured

Stealth
POWER OPTIONS

Power joystick mount
Motion Concepts
FOOT CONTROL

Proportional foot control
Attaches to compact joystick

Switch It

HMC
ARM CONTROL

Switch It!
proportional arm control

Attaches to compact joystick
ARM OR FOOT CONTROLLED JOYSTICKS

Who would you use these with?
PROPORTIONAL HEAD CONTROL

Pushing back moves wheelchair forward

Sustained pressure required to continue movement

- Can lead to increased muscle tone and difficulty stopping

Switch-It!

Dynamic
MAGITEK DRIVE CONTROL

Sensor mounted at top of head
Translates head movement into wheelchair movement
Requires very good head control
Stop: enter Neutral Zone
Who would you use this with?
PEACHTREE

Creative Rehab
- 830-693-6030

Moving further from pad increases speed
Tilt head to left/right for directional control
JOYSTICK HANDLES

Larger handles may reduce muscle tone
Goal post style designed for poor grasp
HANDLE WITH SWITCH

Joystick Extension Fifth switch

Switch built-in

- Can operate reset, mouse click, tilt, etc.
- Mono jack
YOUR TURN!

What is your biggest barrier to recommending this technology?

- lack of experience
- lack of equipment to trial
- funding
QUESTIONS OR COMMENTS?
NEED CHOCOLATE?
DIGITAL ACCESS METHODS

single switch scanning
2, 3, 4 or 5 switch combination
sip ‘n puff
Head Array (proximity)
4 switch array (proximity)
2 or 4 switch fiberoptic array
Analog Digital Drive system
Sip ‘n puff head array
Roll Talk
Tongue Drive
YOUR TURN!

Which of the following have you recommended or worked with?

- Head Array
- Sip ‘n Puff
- Single Switch Scanner
- Random combinations of switches!
SWITCH DRIVING

1 switch: scanning

2 switch: iQ and QLogic, Forward, Left, Right and Reverse (Reset on QLogic)

3 switch: Forward, Left, Right

4 switch: Forward, Left, Right and Reverse or Reset

5 switch: Forward, Left, Right, Reverse and Reset
SINGLE SWITCH SCANNING

Clinical Indicators:
- only 1-2 switch sites can be found
- Client can see and monitor display
SINGLE SWITCH PROGRAMMING

4 or 8 direction
Scan pattern
Scanning “Mode”
2 SWITCH CONTROL

Q-Logic

- Switch 1:
  - 2 activations = Forward, 1 activation = Left, double click = mode

- Switch 2:
  - 2 activations = Reverse, 1 activation = Right
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 a switch interface box and switches
ANY 2, 3, 4 OR 5 SWITCH COMBINATION

Any combination of individual switches
or
Switch array
3 SWITCH DRIVING – MOVIE TIME!

AJ
3 SWITCH DRIVING – MOVIE TIME!

Landon
AN INTERESTING COMBINATION

3 Switch Driving

Right Turns AbleNet Jellybean left medial knee

Forward Jellybean behind left upper arm

Left Turns AbleNet Spec on strap base

Faith
ANOTHER EXAMPLE...

Switch under the chin is not ideal, but it worked...

- She opened her mouth for activation

AbleNet
Jellybean and Spec switches

Amy
AND ONE MORE...

Alexi, TBI, hypersensitive hands
Isolated control at lateral knees
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
SIP ‘N PUFF PROGRAMMING

2 or 4 pressure
- 2 pressure on iQ and QLogic
- Command Time/Sampling Delay

2 pressure
- Between time
- 2 puffs = Forward, 1 puff = Right
- 2 sips = Reverse, 1 sip = Left
SIP ‘N PUFF STOP SWITCH

Stops the wheelchair if the straw moves out of reach
Can also be used as a reset switch
Travis and Jessica
ASL HEAD ARRAY (PROXIMITY)

3 - 5 proximity switches in a tri-pad headrest

Clinical Indicators:
- Fair to good head control
- Little extremity control
HEAD ARRAY WITH BEAM SWITCH
STEALTH HEAD ARRAY

Suboccipital pad can increase stability of the head
PERMOBIL HEAD ARRAY

Total Control Head Array System

- Can combine electrical and mechanical switches
- 6 input jacks on back (1/8”)
  - Mechanical mono
  - Electrical stereo
SOMETHING NEW...STEALTH PRODUCTS I-DRIVE
STEALTH PRODUCTS I-DRIVE

Can combine proximity and mechanical switches
- Mechanical switches require short adaptor cable

Can assign each switch and activation distance using a Tablet

Reverse:
- Double tap or Mode switch to Toggle
HEAD ARRAY – MOVIE TIME!

Austin
HEAD ARRAY – ANOTHER MOVIE

Taylor
ASL 4 SWITCH ARRAY (PROXIMITY)

Typically placed under a tray
Consider tactile cue above (i.e. loop Velcro)
Consider pigtail cable
PROXIMITY ARRAY

Clinical Indicators:
- Fair upper extremity control
- Accommodates larger movement
- Eliminates a plane of movement
ASL 4 SWITCH FIBEROPTIC ARRAY

Small targets
Accommodates very small movements with no force
Typically placed by finger or thumb
Cables are fragile
4 SWITCH FIBEROPTIC ARRAY IN TRAY
ASL 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
AN EXAMPLE

Farid, age 8
SMA, type I
Driving with:

- Forward: 1 fiberoptic switch under right index finger
- Left: 1 fiberoptic switch under left index finger
- Right: 1 proximity switch by left medial knee
- Reset: 1 proximity switch by right medial knee
ANALOG DIGITAL DRIVE SYSTEM

Left and Right pads active on the head array
Forward and Reverse active on the joystick
ASL SIP ‘N PUFF HEAD ARRAY

Left and Right pads active on the head array
Any puff is Forward
Any sip is Reverse
COMBINING MECHANICAL AND ELECTRONIC SWITCHES

Julian

SMA, type I

Microlite, right medial knee, Right

Fiberoptic, left thumb, Forward

Proximities at either side of head for Left and Reset
COMBINING MECHANICAL AND ELECTRONIC SWITCHES

Invacare and ASL

- Julian can control Driving, Reverse, Tilt and Speed
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
EYE GAZE

Roll Talk
TONGUE CONTROL

Only a bunch of college students would volunteer to pierce their tongue...

Still in research at Georgia Institute of Technology
Movement of tongue is translated into movement of the chair
THE FUTURE

Tongue Drive System
Brain controlled
Voice controlled
  - Actually available, but safety concerns
Computer controlled
WHAT TO DO NEXT:

Get to know your suppliers

Get to know the products

- Arrange for manufacturer inservices
- Borrow equipment
- Drive!
- Program!
QUESTIONS?
HANDS-ON TIME

Here is your chance!

Hop in a chair and try out some of the alternative access methods available

Check out the Pediatric Power Wheelchair bases Network!
NEED CHOCOLATE?
ACCESS METHODS

Direct
- Includes Eye Gaze
Switch(es)
Mouse or Joystick
- Translates direct access
Voice

ACCESS: WHAT?

Power wheelchairs (PWCs)
Speech generating devices (SGDs)
Computers
Electronic Aids to Daily Living (EADLs)
Switch toys
ACCESS: HOW?

Switch use varies depending on what you are accessing

- Power wheelchairs and switch toys
  - sustained contact/pressure
  - quick release

- Scanning
  - anticipation and waiting
  - quick activation
  - timing
LET’S GET PRACTICAL!

Think of a client you are working with

As we move through this section, think of where you may try and place a switch and what type of switch for access to a power wheelchair
ACCESS ASSESSMENT

Family/client centered

Positioning

Physical Factors affecting access

Switch Site Hierarchy
  - location vs. type of switch
ACCESS ASSESSMENT

Family/client centered

- ask!

Positioning

- 80%

Juan
IDEAL SWITCH SITE

An ideal switch site uses:

- small movement
- isolated movement
- volitional movement
- controlled activation
- sustained pressure
- controlled release
AN IDEAL SWITCH SITE USES:

A small movement
- avoiding the “big wind-up”
- smaller movement increases speed, accuracy in scanning
- Lauren
  - Efficiency comparison, hand vs. head
AN IDEAL SWITCH SITE USES:

An isolated movement
- not resulting in overflow
- Travis
  - Hip rotation with switch activation
AN IDEAL SWITCH SITE USES:

A volitional movement
- not part of a pattern of movement
- not part of a reflexive movement
- under voluntary control
- Sarah and the boys
AN IDEAL SWITCH SITE USES:

Controlled activation

- activation travel
- activation pressure
  - Brandon – midline placement, switches in close proximity, light touch
- speed
- accuracy
  - Spencer – could activate over right hand, but not with speed and accuracy. Solution – opened seat to back angle; reduced UE flexion
AN IDEAL SWITCH SITE USES:

Sustained pressure
- in power mobility
- fatigue issues
- Julian
  - Small travel and activation pressure
AN IDEAL SWITCH SITE USES:

Controlled release
- timing (particularly in power mobility)
- consistency
- ability to release under stress
- Amy
  - Getting stuck on switch behind head
SWITCH SITE HIERARCHY

Hands
Head
Mouth
Feet
Lower Extremities
Upper Extremities
Mind
SWITCH SITE HIERARCHY: HANDS

Under Tray

Horizontal Placement

Vertical Placement

Grasp
SWITCH SITE HIERARCHY: FINGERS

Fiberoptics

Pinch
SWITCH SITE HIERARCHY

Head
- rotational vs. lateral flexion
- cheeks
  - rooting reflex
- temple
  - glasses
  - eye injuries
SWITCH SITE HIERARCHY

Head
- side of head
  - Can be activated by neck rotation, lateral flexion or lateral jaw movement
SIDE OF HEAD: MOUNTING IDEA

Stealth headrest
  - Replace lateral pad with switch

Stabilizing against the lateral spot pad
SWITCH SITE HIERARCHY

Head
- chin
  - under chin
  - side of chin - Abby
  - can use jaw or
  - head movement
SWITCH SITE HIERARCHY

Head, less used sites

- behind head
- Forehead - Tom
- eye brow
- eye blink
SWITCH SITE HIERARCHY

Mouth
- sip and/or puff
  - lip closure
  - intra oral pressure/control
- tongue
  - protrusion against cheek
  - protrusion forward - Vincent
SWITCH SITE HIERARCHY

Feet
- above foot (dorsiflexion) - Kelly
- below foot (plantar flexion)
- sides of foot
SWITCH SITE HIERARCHY

Lower extremities

- medial knee
- lateral knee - Alexi
- superior knee - Jacob
MEDIAL KNEE
LATERAL KNEE
SWITCH SITE HIERARCHY

Upper extremities

- above shoulder
- behind elbows - Sarah
- forearms

ASL Armrest Mount
ABOVE SHOULDER
BEHIND ELBOW – MOVIE TIME!
SWITCH SITE HIERARCHY

Mind

- brain waves - Kelly
- muscle movement
SO WHAT’S THE MOST UNUSUAL SPOT YOU PUT A SWITCH?
Anyone?
Me - Tammy
LET’S GET PRACTICAL!

Where do you think you might try and place a switch on the client you identified?
Tell the person next to you!
SWITCH TYPES

Mechanical
- activation pressure
- travel

Electrical
- no pressure
- travel often required
- less feedback
MECHANICAL SWITCHES

Plate
Light Touch Plate
Lever
Pneumatic
Other
PLATE SWITCHES

AbleNet Big Red

AbleNet Jellybean Tool bag Item

Spec Tool bag Item

Enabling Devices Pancake

AbleNet Trigger
Adaptivation Pal Pads

LIGHT TOUCH PLATE SWITCHES

Enabling Devices Saucer
LEVER SWITCHES

AbleNet Leaf

ASL Ultralight

AbleNet Flex

AbleNet Micro
Light
Tool Bag
Item

Enabling Devices
Ultimate

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PNEUMATIC SWITCHES

AbleNet Pneumatic

Enabling Devices
Grip

Sip ‘n Puff

AbleNet Grasp
QUESTIONS?
YOUR TURN!

Which Mechanical Switches do you use?
ELECTRONIC SWITCHES

Proximity
Fiberoptic
Infrared
Touch
Sensor
Piezo Electric Film (detects vibration)
Mind Switch (bioelectrical)
PROXIMITY SWITCHES

Adaptive Switch Laboratories Adjustable Proximity

AbleNet Candy Corn
FIBEROPTIC SWITCHES

Adaptive Switch Laboratories Fiber Optic

LocLine for mounting

Michelle’s Tool Bag Item
INFRARED SWITCHES

AbleNet SCATIR (Self-Calibrating Auditory Tone Infrared)

Enabling Devices Eye Blink Switch
TOUCH SWITCHES

Adaptivation Taction Pads

AbleNet Touch Plate Switch
SENSOR SWITCHES

Enabling Devices
Sensor Switch
PIEZO ELECTRIC FILM SWITCHES

Adaptation Vibration

Enabling Devices
Vibration Switch
Latch Switch

Enabling Devices Twitch

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BIOELECTRICAL SWITCHES

Technos America MCTOS

Braingate Neural Interface
LET’S GET PRACTICAL!

What switch type do you think might work for the client you identified?
Tell the person next to you!
QUESTIONS?
TAKE HOME MESSAGE

Optimal switch access is very dependent on optimal positioning

Optimal switch access is dependent on switch training
- Motor skills – 300 hits a day!
- Scanning concepts

Optimal switch access can make or break AT use and subsequent function, subsequent, participation and socialization
BREAK TIME

Please be back in 15 minutes!
MOBILITY TRAINING
BUT FIRST...

The Cookie Survey!
MOBILITY TRAINING

Pre-Mobility Training
- To develop skills before a PWC recommendation

Mobility Training
- To optimize driving that new PWC

Within the school day

Case Studies
YOUR TURN

Do you perform mobility training with students at this time?

- Yes
- No
- I’d like to start!
THE CHALLENGE, PART 1

Students often bring a new power wheelchair to school immediately after delivery due to home and/or vehicle accessibility issues.
THE CHALLENGE, PART 2

The school is often expected to store and charge the power wheelchair, as well as train the new driver in optimal use.
THE CHALLENGE, PART 3

The student and staff have limited time in a busy school day for mobility training
THE CHALLENGE, PART 4

Mobility Training can be accomplished through pull-out times, but training in context can save time and be more effective and motivating for the student.
MOBILITY TRAINING

As part of the evaluation process
- Wheelchair Criteria checklist determines the starting point for training

Before equipment recommendation
- Pre-mobility training

After equipment delivery
- Mobility training
MOBILITY TRAINING PRE-REQUISITES

Positioning
- Optimal to facilitate access

Vision
- Adequate for training and driving

Access
- Optimal for driving
MOBILITY TRAINING

What works with kids:

- Real life experiences
- Starting in a controlled environment
  - Don’t start on the Freeway!
MOBILITY TRAINING

What doesn’t work with kids:

- Computer simulations
- Lots of verbal instruction
PRE-MOBILITY TRAINING
PRE-MOBILITY TRAINING

Working on concepts without a power wheelchair

When indicated:
- child who is only at Cause and Effect or Stop and Go level conceptually;
- when no power wheelchair is available for practice;
- when learning curve is slow
PRE-MOBILITY TRAINING

Goals:

- To develop concepts necessary to benefit from Mobility Training with a power wheelchair
- To prepare for power mobility evaluation
PRE-MOBILITY TRAINING

Stop and Go Concepts
Directional Concepts
Problem Solving
Judgment
STOP AND GO CONCEPTS

Pull Out Activities

- Play Red Light, Green Light
- Play with switch toys and have child make the toy “Go” and “Stop”
- Put a switch or paper circle on tray (if child can use a hand). When the child activates the switch, move the chair. When the child releases the switch, stop. Use consistent, simple vocabulary to reinforce.
STOP AND GO CONCEPTS

As a part of the school day

- Verbalize Stop and Go when pushing the manual wheelchair
- Adaptive PE:
  - Put a switch or paper circle on tray (if child can use a hand). When the child activates the switch, move the chair. When the child releases the switch, stop. Use consistent, simple vocabulary to reinforce.
  - Pull in peers and play a game!
STOP AND GO CONCEPTS

As a part of the school day

- Moving between locations (i.e. class to cafeteria)
  - Place a paper circle or switch on the manual wheelchair
  - When the student presses the “switch” move the chair toward the location. When they let go, stop, say “stop” and wait for the student to press again and move on with the class
DIRECTIONAL CONCEPTS

Pull Out Activities

- Play Follow the Leader
- Put 3 switches or paper circles on tray (if child can use a hand). When the child activates a switch, move the chair in that direction. Use consistent, simple vocabulary to reinforce.
DIRECTIONAL CONCEPTS

As a part of the school day

- Verbalize Direction of movement while pushing the manual wheelchair. Do not need to use Left and Right labels.

- Adaptive PE:
  - Play Follow the Leader
  - Put 3 switches or paper circles on tray (if child can use a hand). When the child activates a switch, move the chair in that direction. Use consistent, simple vocabulary to reinforce.
DIRECTIONAL CONCEPTS

As a part of the school day

- Moving between locations
  - Have student press switches or circles for more than one location
  - Move the manual wheelchair in that direction
PROBLEM SOLVING

Pull Out Activities

- This is best done in the manual wheelchair with 3 switches or paper circles on a tray.
- Choose a destination in the room and ask the child to get to it. Don’t give a lot of verbal instruction, just verbally reinforce what the child has done, i.e. “you pressed the Forward Switch”. Younger children learn problem solving best by exploration.
PROBLEM SOLVING

As a part of the school day

- Adaptive PE:
  - This is best done in the manual wheelchair with 3 switches or paper circles on a tray.
  - Choose a destination in the room and ask the child to get to it. Don’t give a lot of verbal instruction, just verbally reinforce what the child has done, i.e. “you pressed the Forward Switch”. Younger children learn problem solving best by exploration.
JUDGMENT

Pull Out Activities

- Not as applicable
JUDGMENT

As a part of the school day

- Verbalize situations that require judgment while pushing the manual wheelchair
- i.e.: “I had to stop your chair to let those children walk by so that I didn’t bump them”
YOUR TURN!

In what area do you think most of your students require pre-mobility training?

- Stop and go concepts
- Directional concepts
- Problem solving
- Judgment
MOBILITY TRAINING

Working on concepts with a power wheelchair

When indicated:
- When a child is demonstrating emerging directional concepts and problem solving
- When a power wheelchair is available
- When learning curve is shorter
MOBILITY TRAINING

Goal: to develop skills required to recommend a power wheelchair or use a newly acquired power wheelchair optimally
REMOTE STOP SWITCH

Awesome training tool

Wireless

Stops the PWC up to 20 feet away

ASL and Switch-It!
MOBILITY TRAINING

Stop and Go Concepts
Directional Concepts
Problem Solving
Judgment
STOP AND GO CONCEPTS

Pull Out Activities

- In the power wheelchair, have the child Go and Stop on verbal command
- Play games such as Red Light, Green Light
- Goal: stopping on command quickly
STOP AND GO CONCEPTS

As a part of the school day
- While driving from the classroom to the cafeteria (or another destination), walk next to the student
- Encourage the student to stop and go when appropriate
Pull out Activities

- In the power wheelchair, ask the child to move in an indicated direction. This gives the child an opportunity to discriminate between directional switches or joystick movement.
- Play Follow the Leader
- Bring in peers!
DIRECTIONAL CONCEPTS

As a part of the school day

- Have the student follow the rest of the class from the classroom to the cafeteria or library
- The student will be less likely to bump anyone while in the back
PROBLEM SOLVING

Pull out Activities

- In the power wheelchair, have the child move to a location in the room that requires more than one directional command to reach
- Play Follow the Leader, Hide and Seek
  - Pull in peers!
- As the child progresses, move on to more realistic situations, such as going down hallways, through doorways, etc.
PROBLEM SOLVING

As a part of the school day

- Have the student deliver attendance to the office or other papers
- When the class moves to a different area, have the student try the following:
  - Go through the classroom door without assistance
  - Go down the hallway
JUDGMENT

Pull Out Activities

- Place obstacles in the child’s way to see if they will stop and/or go around these.
- Move on to real life situations to train appropriate judgment i.e. crossing the street
JUDGMENT

As a part of the school day
- Provide rewards for safe driving
YOUR TURN!

What are your biggest obstacles to Mobility Training?

- Lack of student time
- Lack of staff time
- Student lacking skills
- Staff lacking skills
COMMON CONCERNS

Safety of other students
Behavioral issues
STUDENT SAFETY

Training in context increases risks of bumping walls and other students

Solution:
- Don’t start in context training around a lot of other students right away
  - Like learning to drive a car
- Reduce power and/or torque so PWC has less force
BEHAVIORAL ISSUES

If a student is acting up, try and address this the same way you would a typical student whenever possible
BEHAVIORAL ISSUES

Gabriel
CP, age 5

Behavioral issues:
- Driving too fast
- Bumping walls

Solutions:
BEHAVIORAL ISSUES

Shannon
Down’s syndrome, age 15

Behavioral issues:
- Crashing
- Thinks it is funny

Solutions:
BEHAVIORAL ISSUES

Kristi
CP, age 14

Behavioral issue:
- crashing
- Defiant, not listening

Solutions:
BEHAVIORAL ISSUES

Brian
TBI, age 19

Behavioral Issues:
- Crashing
- Aggressive
- Poor judgment

Solutions:
MOBILITY TRAINING TAKE HOME MESSAGE:

Pre-mobility training can develop the skills required to drive a power wheelchair.

Mobility training can optimize driving skills for increased function, safety and independence.
QUESTIONS?
TODAY’S TAKE HOME MESSAGES

Early Mobility has been clearly linked through research to key developmental skills.

Positioning is critical to optimal access to a power wheelchair.

Many access options are available.

Programming is essential to optimize access.

Power seating functions are often beneficial.

New electronics include IR transmission for control of devices in the environment and mouse emulation.

Mobility training can optimize functional driving.
THANK YOU!!!
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