Slide 1

Stealth i-Drive
Head Array

POWER WHEELCHAIR DRIVING METHODS, PART 1

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Quantum
Rehab
Stretto

QUANTUM®   Stealth Products
Solutions For Life

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Slide 2

Introductions

• Hello!
  • Introductions all around!
    • Goals for today

• Disclosure:
  • Michelle: while I do teach educational courses for Stealth Products, a manufacturer of alternative driving methods, I am in Private Practice, I use a variety of equipment, and will attempt to present this information in a non-biased way
  • Wade: I am a Physical Therapist by background and am currently employed by Quantum Rehab as a Clinical Education Manager.

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Slide 3

Learning Outcomes:

1. The participant will be able to describe 3 reasons clients may not be able to use a standard joystick.
2. The participant will be able to list 3 alternative proportional driving methods and clinical indicators for each.
3. The participant will be able to operate a power wheelchair with at least 3 alternative proportional driving methods.

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Slide 4

Handouts

• Mini Proportional Joystick Comparison Chart
• Joystick Decision Making Tree
• Non-proportional Driving Methods Decision Making Tree
• Head Array Comparison
• Programmable Driving Methods

• Also available at www.atilange.com, under Resources

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Slide 5

What we will be covering:

• Power Wheelchair Driving Methods
  • Driving Methods – Proportional (Analog)
  • Driving Methods – Non-Proportional (Digital)

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Slide 6

Do I get to play?

• Hands-on time today!
  • Yes!
  • We also have lots of videos and can have lots of discussion!
  • And we encourage you to follow-up with your manufacturer reps to try these out further!

ASL ATOM

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Power Wheelchair Driving Methods

- There are many power wheelchair driving methods available
- This provides a means of independent mobility for a wide variety of clients, including children

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Some thoughts…

- Impact on Power Wheelchair Driving Method success:
  - Optimal positioning
  - PWC assessment
  - Drive wheel configuration
  - Tracking technologies
  - Programming
  - Mobility training

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Proportional Driving Methods

- Also called **Analog**
- Primarily Joysticks
- 360 degree directional control
- Speed control
- vs. **Digital**

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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

Quantum Rehab Q-Logic 3 joystick

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Clinical Decision Making

- Does the client have the ability to grade the force and distance of their movement?
  - Yes
    - Explore Standard Joysticks
  - No
    - Explore Digital Driving Methods

R-net joystick

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Clinical Decision Making

- Does the client have adequate movement and motor control for joystick use?
  - Yes
    - Explore Standard Joystick
  - No
    - Explore Digital Driving Methods

Invacare LiNX joystick

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Clinical Decision Making

- Can the client optimally control a standard joystick mounted at the end of the armpad?
  - Yes
    - Explore standard mounting
  - No
    - Explore alternative placements

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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

14

Swing away joystick mounts

- Allows more midline placement

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Joystick Angles

- The angle of the joystick can also be changed to match the angle of client movement

Invacare
LiNX joystick

Angled to accommodate
oblique angle

Angled to accommodate
pronation

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Remember…

- We can make the client 'fit' the equipment
  - or
- We can make the equipment 'fit' the client

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Clinical Decision Making

- If a midline mount is required, does the client need to independently move this out of the way?
  - Yes
    - Explore power mounting
  - No
    - Caregiver can move mount out of way for transfers

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3

Power Options

- Motion Concepts Power joystick mount

19

Clinical Decision Making

- Does the client have difficulty grasping a standard joystick handle?
  - Yes – Explore other style joysticks or other handles
  - No – Explore standard joystick

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Mushroom Joystick

- Designed for clients who cannot grasp a joystick handle
  - Two handle sizes
  - Provides a resting spot for the wrist
  - Also works well at the foot
- Alternative:
  - Bodypoint dome handle
  - Textured

Stealth

Bodypoint

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Joystick Handles

- Goal post style designed for poor grasp

Bodypoint

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Clinical Decision Making

- Does the client have excessive force which could break a standard joystick?
  - Yes – Explore heavy duty joystick
  - No – Explore standard joystick

Stealth Heavy Duty
650 grams of force
40 mm throw

Mo-vis Heavy
Duty Joystick

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Heavy Duty Joystick

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

Mo-vis Heavy
Duty Joystick

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Heavy Duty Joystick

- Mo-Vis
- All-round Heavy Duty Joystick
- For clients who use excessive force
  - Enlarged throw (40 mm) and force (650 grams)
- Non-removable handle
- 2 switch jacks
  - Power and Mode
- Mini USB port for programming
- Retrofit a standard joystick to accommodate excessive force

Stealth Heavy Duty
650 grams of force
40 mm throw

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Mo-Vis

- Mo-Vis is in Belgium
- Distributed by Stealth Products and Permobil
- Great line of alternative driving methods
- Unique programming software

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Time-Out!

- In the USA, we have 4 main PWC Electronics packages:
  - R-Net
    - Permobil
    - Quickie PWCs (under Sunrise Medical)
  - Q-Logic
    - Quantum Rehab PWCs (under Pride Mobility)
  - LiNX
    - Invacare PWCs

- Each electronics package has unique programming features

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Power Wheelchair Driving Methods

- Each power wheelchair comes standard with a joystick
- Alternative driving methods are made by companies which are owned by the major PWC manufacturers:
  - Invacare
    - Adaptive Switch Labs (ASL)
  - Quantum Rehab
    - Stealth Products, Mo-Vis
  - Permobil
    - HMC, Mo-Vis
  - Quickie
    - Switch It
- **Most driving methods are compatible with ANY PWC**

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Clinical Decision Making

- Is there adequate room to mount a standard joystick where required for optimal control?
  - Yes – Use a Standard Joystick
  - No – Consider Compact Joystick

Quantum Rehab
Q-Logic 3 joystick

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Compact Joystick

- Compact Joysticks take up less space
- Increases mounting options
- Strategy required to change modes and control power

Mo-Vis All Round
Compact joystick

ASL
Compact
Joystick
Single

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Compact Joystick

- Compact Joystick Single Switch
- Textured for easier grasp
- Top is non-removable
- One switch on top of joystick acts as a Reset

- Dual Switch version
  - Two switches on top of joystick send signals thru 2 switch jacks

ASL

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Time-Out!

- Mode?
- When a PWC is first turned on, it is in Driving Mode
- The Reset or Mode switch changes the Mode of operation of the PWC
- The Reset/Mode switch can provide access to:
  - Reverse
  - Speeds
  - Power Seating
  - Mouse emulation (through BT)
  - IR transmission
  - Control of an interfaced AT device

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Compact Joysticks

- ASL
  - Compact Joystick Single Switch
    - Dual Version
- Mo-Vis
  - All Round Joystick
    - Light version
- Switch It
  - Versa Guide
    - Light version (EZ)

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Max

- Max uses a Compact joystick to drive his power wheelchair
- Reset behind his left elbow
- Splint for stability and consistent wrist position for optimal joystick control

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Clinical Decision Making

- Does the client have the ability to grade the force and distance of movement, as well as have adequate movement and motor control, but not at the hand?
  - Yes, at the foot
    - Explore proportional foot control
  - No – explore Digital Driving Methods

Movis

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Foot Control

- Proportional foot control
- Attaches to compact joystick
- Some clients will have better control with the foot "free"

HMC/Permobil

Stealth Footrest Adapter for Mushroom

Movis

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Riley

- Riley drives with her right foot on a custom 3D handle similar to a goal post style, mounted to a Stealth Products Mushroom Joystick

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Clinical Decision Making

- Does the client have adequate force to initiate and sustain joystick direction?
  - Yes – Explore Standard Joysticks
  - No – Explore Mini Proportional Joysticks

Mo-vis Multi mini proportional joystick

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Mini Proportional Joysticks

- Mini Proportional Joysticks require less active force and travel to activate
- Standard joystick requires approximately 250 grams of force
- Many Minis require approximately 50 grams of force
  - Often appropriate for use at the chin
- Many Minis require approximately 10 grams force
  - Often appropriate for use at a finger or thumb

Switch It Micro Pilot

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Clinical Decision Making

- Will the client use the mini joystick by the chin?
  - Yes
  - Mini proportional joysticks require less force than a standard or compact joystick, reducing RSI risk
  - Minis requiring approximately 50 grams of force work best at the chin

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Mo-Vis Mini Proportional Joysticks

- Mo-Vis
- Mo-Vis Multi Joystick
  - 49 grams
  - 7.1 mm throw
  - 2 switch jacks on joystick and on interface box
  - Mini USB on configuration box for programming
  - Various mounting options

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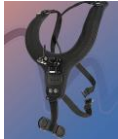## Switch It Mini Proportional Joysticks

- MicroPilot
  - Isometric joystick
  - Requires very little throw
  - Relies on force instead, approximately 10 -50 grams
  - Adjustable force
  - May result in less extraneous movement by the chin
  - Can mount parallel to floor

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7

Clinical Decision Making

- Will the client use the mini joystick by the chin?
  - Yes
  - Are Secretions an issue?
    - Yes
      - Use a sealed mini proportional joystick

Mo-Vis Chin Control Harness

Stealth Products

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ASL Mini Proportional Joystick

- Extremity Control
  - 120 grams
  - sealed

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Stealth Mini Proportional Joysticks

- Precision Mini Proportional Joystick (PMP)
  - Sealed
- i-Drive version
  - A line of alternative access methods that work on any PWC electronics package and can be programmed through the PWC programmer or separately through i-Drive software on a computer or tablet
  - Can combine with switches

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iDrive

- A line of programmable driving methods
- Stealth Products
- Includes USB and BT programming options
- iClick mouse emulation capable
- Compatible with Loonz App
- Compatible with Stealth VR

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Clinical Decision Making

- Will the client use the mini joystick by the finger or thumb?
  - Yes
  - Minis with approximately 10 grams of force work well in this area
    - Less leverage by finger or thumb than by chin

Permobil HMC

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ASL Mini Proportional Joysticks

- ASL Extremity Control
  - 120 grams, sealed
- Molecule
  - Magnet returns joystick to center
- MEC
  - 18 grams

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Mini Proportional Joysticks

- HMC
  - Permobil
  - 13 grams

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Mo-Vis Mini Proportional Joysticks

- Mo-Vis
- Mo-Vis Micro Joystick
  - 8.5 grams
  - 3.3 mm throw
  - 2 handles
  - 2 switch jacks on interface box
  - Mini USB on configuration box for programming
  - Various mounting options

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Mo-Vis Configurator Software

- Many parameters can be adjusted separate and in addition to the power wheelchair programming parameters
- Road Compensation
  - The wheelchair automatically slows when encountering uneven terrain
  - Prevents reduced control with sensitive joysticks mounted at the hand or chin
  - Adjustable in X & Y axes
- Tilt Sensing
  - If joystick is tilted more than 45 degrees, it will not longer respond
  - Can be enabled or disabled

ROAD
COMPENSATION

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Switch It Mini Proportional Joysticks

- MicroPilot
  - Isometric joystick
  - Requires very little throw
  - Relies on force instead, approximately 11 - 50 grams
  - Adjustable force
  - Can mount parallel to floor
- Micro Guide
  - Non-Isometric
  - 25 grams

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Clinical Decision Making

- Does the client have difficulty using a joystick by the hand during cold conditions?
  - Yes
  - Try a hand warmer

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Other Items!

- Mo-Vis
- Hand Warmer
  - Hard to drive when hands are cold
    - MS
    - Duchenne
  - Recycles air from in front of warmer to reduce energy consumption
  - Programmable
    - Temperature, fan speed
 - Optional Hand Hood

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Mini Proportional Joysticks

- Mounting options
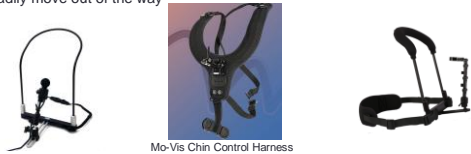 - Hand
  - Head

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Clinical Decision Making

- Choose a mount by the chin.
  - Swing away mount stays in position relative to the wheelchair
  - Bib or harness mount stays in position relative to the client
  - Does the client need to move the mount independently?
    - Power mount

Stealth Products Swing away style mount

Stealth Products Harness style mount
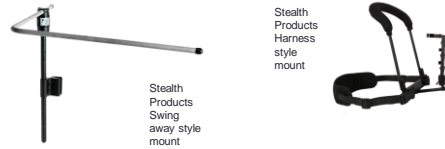
56

Mounting - Head

- Harness and bib
- Some clients need the joystick mounted at the chin
- Some mounting options mount to the client
- This keeps the joystick in better alignment with the client, though does not readily move out of the way
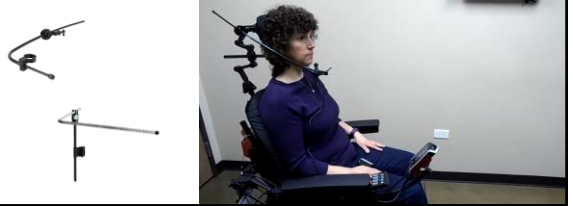

Mo-Vis Chin Control Harness

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Mounting - Head

- Swing-away bar
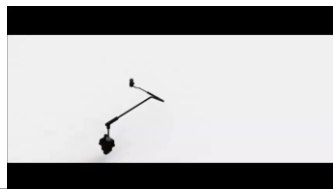 - Stays in position relative to the chair

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Head - Power Options

- Power swing away
  - Joysticks
  - Sip 'n Puff
  - Any control by mouth
  - Hydration
  - Lightweight devices

Mo-Vis Multi Swing

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Clinical Decision Making

- Choose a mount by the hand.
  - Ensure that the forearm, wrist and hand are well supported
    - Armtrough or tray
  - Ensure the joystick is mounted in the optimal position
    - Hand pad
    - Midline and/or swing away mount, as needed

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Mounting - Hand

- Many clients using a mini proportional joystick by the hand require hand and forearm support
- Mounting in a tray or hand tray provides support, protects the joystick and provides height adjustment in relation to the tray

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Ryan

- Micro in a handpad
- Mode by medial knee, twister switch on locline

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Review Time!

- What is an option for each of the following scenarios?
  - The client does not have the best control of the joystick at the end of the armrest
    - Midline mount
  - The client needs a smaller joystick, perhaps for alternative placement
    - Compact joystick
  - The client needs a more sensitive joystick
    - Mini Proportional joystick

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POWER WHEELCHAIR DRIVING METHODS, PART 2

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Wade Lucas, PT, DPT, ATP/SMS

Stealth i-Drive Head Array

Quantum Rehab Stretto

QUANTUM

Stealth Products
Solutions For Life

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Learning Outcomes:

1. The participant will be able to describe 3 reasons clients may not be able to use a proportional driving method.
2. The participant will be able to list 3 alternative non-proportional driving methods and clinical indicators for each.
3. The participant will be able to operate a power wheelchair with at least 3 alternative driving methods.

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Non-Proportional Driving Methods

- Also called Digital
- Primarily Switches
- One switch per direction
- Speed control
- vs. Analog

AbleNet switches

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Clinical Decision Making

- Client cannot use any type of joystick
  - Joystick control requires the ability to grade the force and distance of movement
  - The client must also have adequate movement and motor control to use a joystick
    - No – explore Digital Driving Methods

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## Clinical Decision Making

- Client has fair upper extremity control
- Common DXs: CP, TBI, MS, MD
  - Individual mechanical switches on a tray surface

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Clinical Decision Making

- Client has fair upper extremity control
- Common DXs: CP, TBI, MS, MD
  - But client does not have controlled vertical movements
  - More difficult for clients with increased tone
    - Proximity array under tray
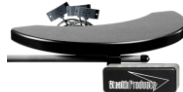
75

Proximity Array

- Clinical Indictors:
  - Fair upper extremity control
  - Accommodates larger movement
  - Eliminates a plane of movement

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Proximity Switch Arrays

- Typically placed under a tray
- Consider tactile cue above (i.e. loop Velcro)
- Consider pigtail cable
- ASL, Stealth

ASL

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Proximity Switch Arrays

- Magitek Rotatable Sensor Array
- Great for people with ALS who still have control of the lower extremities

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12

Clinical Decision Making

- Client has good fine motor control, but limited activation travel and force
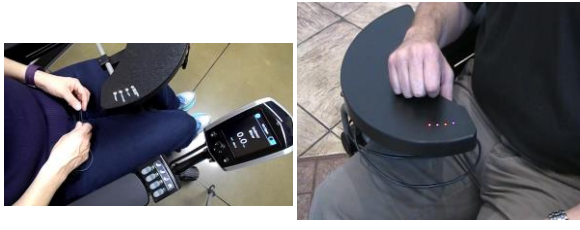- Common DXs: ALS, SMA, MD
  - Fiberoptic switches

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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, Stealth

ASL

Switch-It!

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Fiberoptic Switch Driving

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Fiberoptic Switch Arrays

- ASL
- Teach mode to set activation distance, then turn off
- Fine tune manually

ASL

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Stealth Products Fiberoptic Arrays

- 2, 3, 4 switch arrays
- Handpad mount option with mini goosenecks
- Tuning

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Clinical Decision Making

- Client has good head control, but little extremity control
- Common DXs: SCI, ALS, CP, MS
  - Switch It Vigo
  - Magitek (proportional)
  - Proportional Head Control (RIM) (Proportional)

ASL RIM Control

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Switch It Vigo

- Now Technologies Switch It Vigo
- Wireless wheelchair head controller

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Magitek Drive Control

- Older driving method with some new features
- Sensor mounted at top of head
- Translates head movement into wheelchair movement
- Requires very good head control
- Stop: enter Neutral Zone

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Magitek Drive Control

- Features
- Emergency Stop Switch Port
- Over rate
  - Shuts down system with sudden movement (i.e. sensor falls off head)
- Over range
  - If the client moves too far from center and stays there, the PWC stops

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Clinical Decision Making

- Client has fair head control, but little extremity control
- Common DXs: CP, TBI, high level SCI
  - Head Array

Switch-It

89

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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ASL and Switch It original Head Arrays

- Older driving method
- Tri-pad Head Array

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ASL ATOM Head Array

- Electronics are attached to the head pad
- New features
  - Client can turn the head array on and off by pressing an external switch (user switch)
- Hold user switch for a programmable amount of time (long beep) and then use directional switch to send a wireless switch signal to another AT device (i.e. SGD, Computer, tablet)
  - No Interfacing component required
- Can change reset double tap to longer hold (R-net, Q-Logic)
- Can turn on auditory feedback when a directional switch is activated

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ASL ATOM Head Array

- Various configurations available

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ASL Fusion

- Pads include proximity switches and pressure sensors
- Increased force increases speed (proportional)
- Each pad can be programmed as proportional or digital
- Can wirelessly connect to AAC device, Tecla E
- Auditory feedback
- Can assign pads to different directions
- Mouse emulation through ATOM wireless mouse emulator
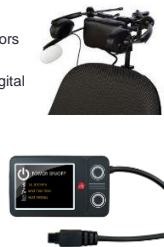
94

Permobil Head Array

- Total Control Head Array System
  - Can combine electrical and mechanical switches
  - 2 Proximities in rear pad to facilitate diagonals
    - Can program to require that both switches have to be activated to drive or just one
  - 6 input jacks on back (1/8")
    - Mechanical mono
    - Electrical stereo

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Stealth Products i-Drive

- Can combine proximity and mechanical switches
  - Mechanical switches require short adaptor cable
- Can assign each switch using a Tablet
- Reverse:
  - Double tap or Mode switch to Toggle
- Works with wide variety of head supports
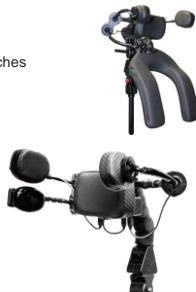
96

Head Array - iDrive

Jonathan

97

15

Switch It Dual Pro

- Programming can be done on back pad
- 3 control options:
- Proximities only
- Mechanical only
  - Increased force on switch increases speed
- Proximities and Mechanical
  - Proximities respond immediately
  - Increased force increases speed

- Increased force and lead to increase tone, difficulty stopping, and increased fatigue

98

Head Array and Reverse

- Mode switch to Toggle Forward and Reverse
- Quick tap of the Head

99

Clinical Decision Making

- Client has good oral motor control, but little head or extremity control
- Common DXs: high level SCI
  - Sip 'n Puff

Permobil

101

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

Therafin

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Sip 'n Puff programming

- Traditional control: 4 pressure
  - Forward: hard puff
  - Right: soft puff
  - Reverse (or stop): hard sip
  - Left: soft sip
  - Latch
 - Speeds

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iDrive Sip 'n Puff

- 4 pneumatic commands
- Pressures programmed on iDrive software
  - Can hold on tablet in front of client for better feedback
- Proportional speed
  - i.e. creeping up to table
  - Stage 1
- Traditional control
  - Stage 2

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Sip 'n Puff programming

- 2 pressure
  - Q-Logic
  - 2 puffs = Forward, 1 puff = Right
  - 2 sips = Reverse, 1 sip = Left
  - Sampling Delay
  - Between time

2 puffs

1 sip   1 puff

2 sips
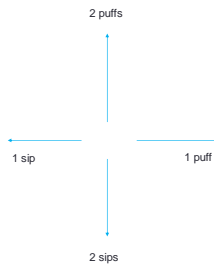
105

Clinical Decision Making

- Client has partial oral motor control and partial head control
- Common DXs: MS, TBI, SCI, CP
  - Sip 'n Puff Head Array Combo

Stealth

ASL

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Sip 'n Puff Head Array

- Left and Right pads active on the Head Array
- Any puff is Forward
- Any sip is Reverse
- May work for clients who cannot discriminate between hard and soft pneumatic commands

Permobil

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Combination Systems

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Clinical Decision Making

- Client has adequate motor control at 4 specific body sites
- Common DXs: CP, TBI, ALS, SMA, MD
  - 4 mechanical and/or electrical switches for Forward, Left, Right and Reverse or Reset
  - Optimal switch placement is where client has **small, isolated, repeatable, and sustained ability to activate and release a switch**

Switch-it

110

4 switch combination

- Clinical Indicators:
  - Ideally, 3 switch sites provides Forward, Left and Right directional control
  - Strongest switch site = Forward
  - If a 4th switch can be identified, Reset provides the most function
    - And requires the least motor control
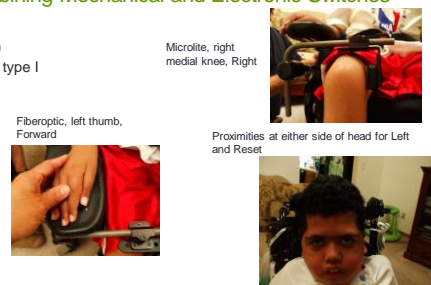

ASL

111

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Switch Interfaces

- Stealth Products iDrive
- Any combination of mechanical and electrical switches

- Stealth Products 5/6 switch box
- Any combination of mechanical switches

- Switch-It Cool Cube
  - Interfaces with any combination of mechanical and electrical switches
  - Pro Spot switches
    - Speed increases with pressure

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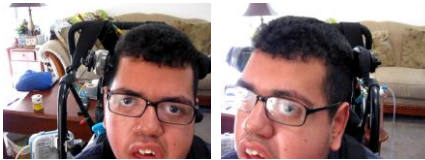## Combining Mechanical and Electronic Switches

- Julian
- SMA, type I

Microlite, right medial knee, Right

Fiberoptic, left thumb, Forward

Proximities at either side of head for Left and Reset
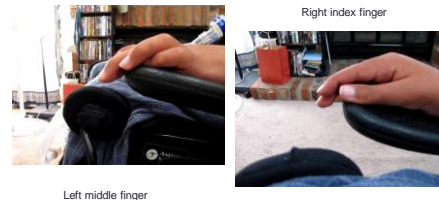

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Julian

- 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 index finger

Left middle finger

115

Julian

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Clinical Decision Making

- Client has adequate motor control at 3 specific body sites
- Common DXs: CP, TBI, ALS, SMA
  - 4 mechanical and/or electrical switches for Forward, Left, and Right
  - Reverse or Reset can be added later or consider Standby

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AJ Driving with 3 switches

- Switches by each lateral knee
  - Left
  - Right
- AbleNet Specs switch in left hand
  - Forward
- Cerebral Palsy

118

Miles driving with 3 switches

- Switches by either side of head for Left and Right
- Switch on tray for Forward
- Age 3 years
- Meningitis at 3 months

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Clinical Decision Making

- Client has adequate motor control at 2 specific body sites
- Common DXs: CP, TBI, ALS, SMA

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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
- Stealth i-Drive

ASL

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2 Switch Control

- Q-Logic
  - This has been around for a little bit, but many folks have not heard of this yet
  - 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 i-Drive: 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
  - If client can use a 3rd switch, this can be Reset
- Can use with mechanical and/or electrical switches

123

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Clinical Decision Making

- Client has adequate motor control at 1 specific body site
- Common DXs: CP, TBI, ALS, SMA
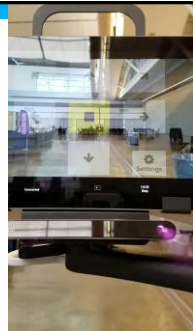
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Single Switch Scanning

- Clinical Indicators:
  - only 1-2 switch sites can be found
  - Client can see and monitor display
  - May be included on PWC Display
    - Options vary with electronics package
  - Newer ASL option:
    - UNO Single Switch Scanner with BT

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Eye Gaze

- Tolt Technologies Ability Drive
  - Modified tablet and eye tracking camera
  - Look at 1 of 8 possible directions

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Review Time!

What is an option for each of the following scenarios?
- The client has fair to good head control, but little control of their extremities
  - Head Array
- The client has fair to good upper extremity control, but cannot use any joystick
  - Proximity Array in tray
- The client has very small, well-controlled movements
  - Fiberoptic Array
- The client only has one switch site
  - Single Switch Scanning

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Next steps:

- Work with your supplier and manufacturers for further inservices, product and client evaluation!
- Contact your local reps to try out some of this awesome technology!
- Drive!
- Identify potential clients and evaluate and/or refer!

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Take Home Message:

- There are many ways to drive a power wheelchair!
- Positioning, Drive Wheel Configuration, Tracking Technologies, Programming, and Training optimizes driving for an individual

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Other Resources:

- www.atilange.com
- Under Resources:
  - Indoor Power Mobility Criteria
  - Pre-Mobility Training Guidelines
  - Mobility Training Guidelines

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- Stealth Products
- www.stealthproducts.com
- Check out Dealer & Clinician Resources, Provider's Corner

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