Interdisciplinary Stroke Care: Managing Patients Pre & Post Botox®

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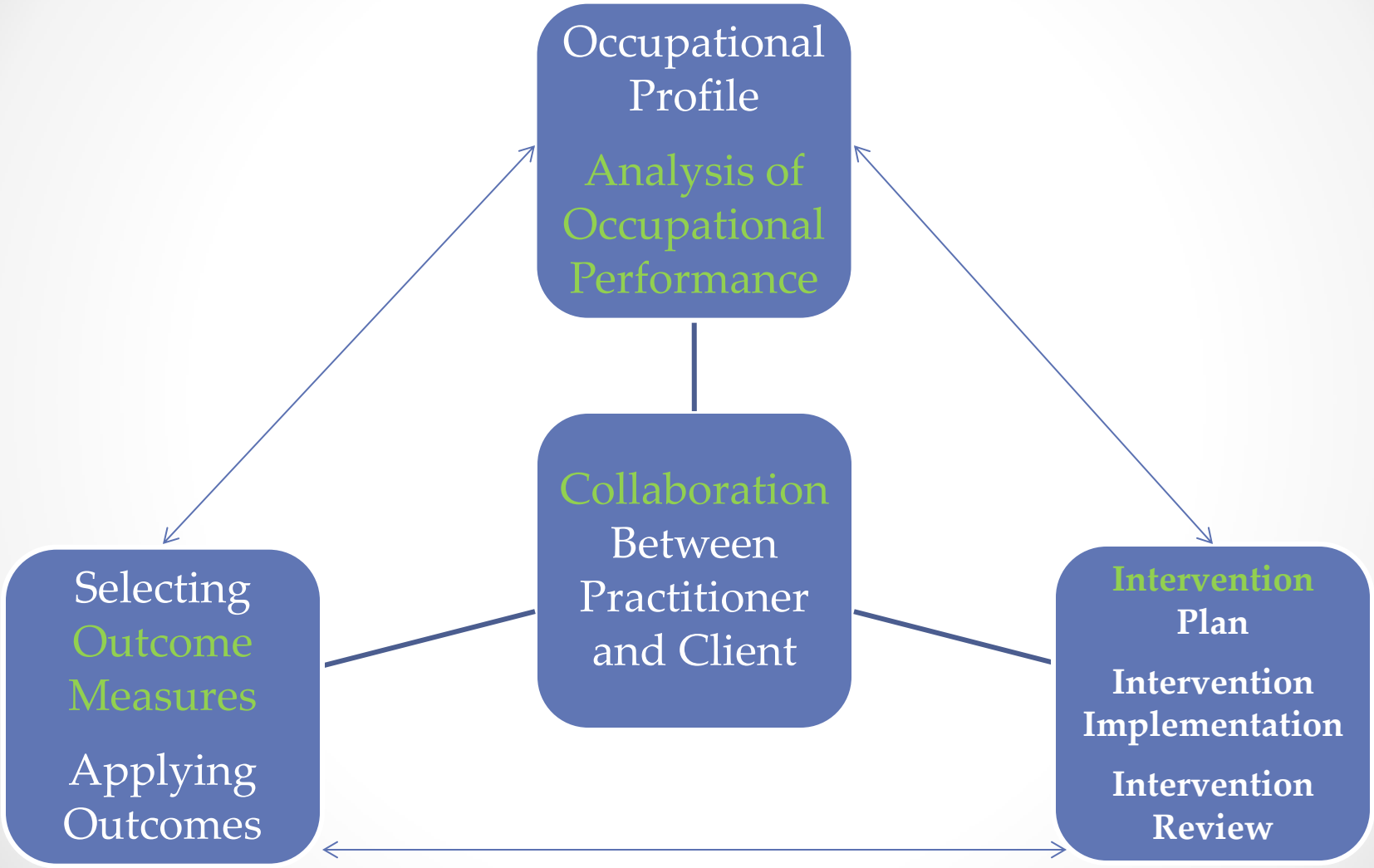
Objectives

1. Participants will identify two functional outcome measures used to determine upper extremity function post stroke and post BOTOX®.

2. Participants will identify two potential muscles commonly recommended for injection.

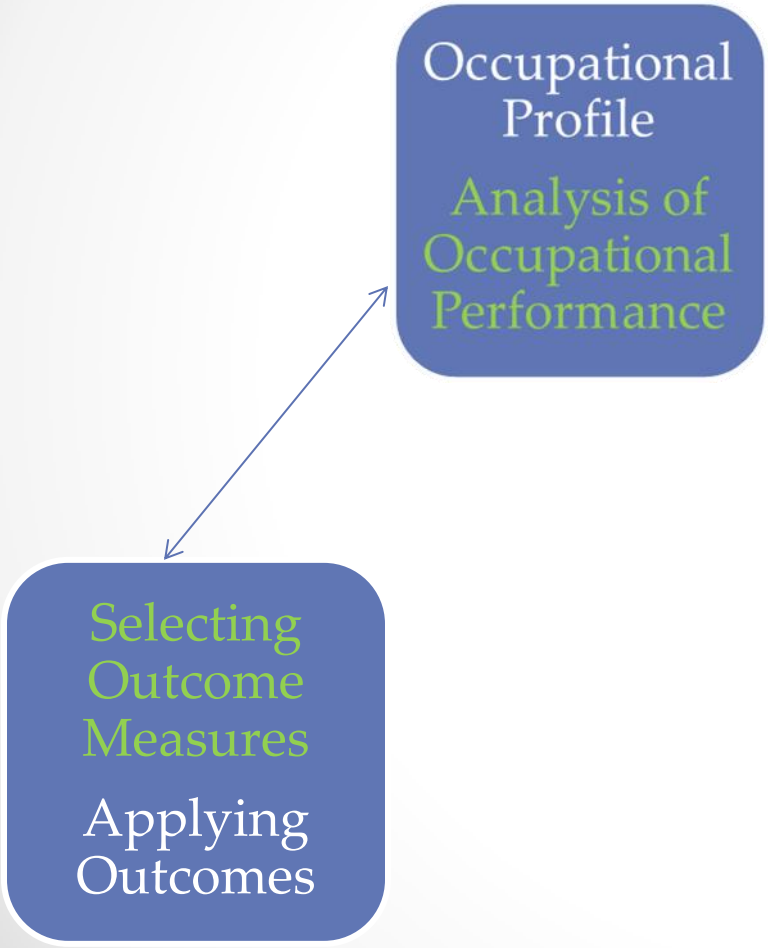
3. Participants will identify three functional activities used to promote upper extremity motor recovery after BOTOX® in the post stroke population.

Evaluation Process



(AOTA Practice Framework, 2014)

Assessment of Motor and Process Skills



- Occupation-based; Occupation-focused
- Designed to evaluate the quality of a persons performance of activities of daily living
- Standardized ADL performance analysis of ADL motor and process performance skills
- Quality of each skill is measured on a four point scale (4-competent performance) (1-unskilled deficient performance)

(Fisher & Bray Jones, 2012)

AMPS Motor Skills	AMPS Process Skills
Body Position: Stabilization Aligns Positions	***Sustaining performance:*** Paces Attends Heads
Obtaining and holding objects: Reaches Bends Grips Manipulates Coordinates	***Applying knowledge:*** Chooses Uses Handles Inquires
Moving self and objects: Moves Lifts Walks Transports Calibrates Flows	***Temporal organization:*** Initiates Continues Sequences Terminates
Sustaining performance: Endures Paces	***Organizing space and objects:*** Searches/ Locates Gathers Organizes Restores Navigates
	Adapting performance: Notices/ Responds Adjusts Accommodates Benefits

(Fisher & Bray Jones, 2012)

Analysis of Occupational Performance

- "SNAPSHOTS" determine most limiting factors leading to performance breakdown
- Is spillage from utensils happening during hand to mouth? Could it be excessive tone in the pronator teres contributing to reduced supination?
- Is it difficult to reach for door handles or light switches because of excessive tone in the biceps or pectoralis muscles?
- Is release difficult because of increased tone in the flexor digitorum superficialis muscle?

Outcome Measures: ICF classified

Clarifies causes of performance breakdown

Body Structure/Impairment	Activity	Participation
Chedoke-McMaster (Arm, Hand)	Chedoke-McMaster (Gross Motor Index-Walking)	COPM
Grip Strength	Action Research Arm Test (ARAT)	Stroke Impact Scale
Modified Ashworth	Wolf Motor Function Test	
Fugl Meyer	FIM	

Body Structure/Impairment OM: Chedoke-McMaster Arm/Hand

- Separate "staging" using Brunnstrom principles for motor recovery of postural control, arm, hand, leg, and foot on the **IMPAIRMENT LEVEL**
- Start testing in the middle of the scale at STAGE 3 and work up/down based on performance
- In order to move"UP" a stage, need to correctly perform 2/3 movements
- Simple and quick
- Excellent reliability and validity, correlated with Fugl Meyer and FIM

OM: Chedoke-McMaster Arm/Hand

Activity Level OM:

Wolf Motor Function Assessment

- Measures UE motor ability through 17 timed ACTIVITY tasks including gross motor reaching, functional prehension (picking up pencil, stacking checkers), and functional activity (drinking, turning key, lifting basket)
- Excellent reliability; excellent internal consistency; adequate validity with AMFM
- Approximately 30 minutes to administer
- Can use MDC values to separate out items for goal writing
- Great way to incorporate the published interpretation values (MDC) is to incorporate them directly into goal writing to show real change

Goal Writing with Outcome Measures

- **Short Term Goal with MDC values**
  - Patient will demonstrate increased functional hand use and prehension as indicated by decreasing performance time for stacking 3 checkers in the WMFT by 3.2 seconds or more.

- **Long Term Goal with MDC values**
  - Patient will demonstrate increased functional upper extremity use overall as indicated by decreasing average performance time of final score on the WMFT by 0.7 seconds or more.

What else do you see?

Occupational Therapists specialize in identifying breakdown in function and occupational performance. You need to now ask yourself:

WHAT IS CONTRIBUTING TO THIS BREAKDOWN?

- Strength ?
- Motor planning ?
- Spasticity ?

Tone and Spasticity

TONE

- Degree of muscle tension or resistance during stretching
- Hypotonic – low muscle tone
- Hypertonic- high muscle tone; risk for contractures

SPASTICITY

- Motor disorder during velocity-dependent increase in tonic stretch reflexes (Active OR Passive)
- Sign of REFLEX DYSFUNCTION
- Hyperexcitability possibly due to disorganized motor units in motor cortex: Sign of UMN Syndrome

Spasticity Impact

30% of strokes result in spasticity (Mayer and Esquenazi, 2003)

Wissel et al. 2010

- 25% of patient develop spasticity in first 6 weeks but can develop at any time
- Elbow 79% of patients
- Wrist 66% of patients
- Ankle 66% of patients
- Shoulder internal rotation, adduction with elbow/wrist/finger flexion

Spasticity Impact

- Greatly affects quality of life
- Greatly affects quality of movement and ultimately can cause changes in soft tissue integrity
  - Muscle stiffness, atrophy
  - Nerve entrapment and pain
  - Disruption in muscle-tendon length
  - Fibrosis

Modified Ashworth Scale (MAS)

- 0 No increase in tone
- 1 Slight increase in tone, catch/release
- 1+ Slight increase in tone, catch/release, MIN resistance through < 50% of ROM
- 2 Marked increase in tone through most of ROM, parts easily moved
- 3 Considerable increase in tone, PROM difficult
- 4 Affected parts rigid in flexion or extension

MAS is the most preferred clinical measurement of tone because of its efficiency despite the exclusion of velocity from the testing context.

Interdisciplinary Collaboration

1. The OT determines spasticity is limiting function and strengthening after completing appropriate OM (WMFT, etc) and spasticity screening (MAS).

2. Referral is made in team rounds for BOTOX® assessment to determine if client is appropriate.

3. OT and injecting physician work together to determine most appropriate muscles for injection.

4. Strong partnerships may result in the OT providing insight to physician for dosing based on potential functional goals to ensure client is not under- or over-injected.

Interdisciplinary Collaboration: What do you report?

Functional Changes

- Doesn't tolerate proper UE positioning in abduction, shoulder pain at rest, difficulty with UED
- Unable to tolerate splint, unable to release items
- Difficulty stabilizing items upright

Specific Muscle Groups

- Tight internal rotators
- Pectoralis, Biceps, Teres Minor, Brachioradialis
- Tight finger and wrist flexors
- FDS, FDP, FCR, FCU
- Tight pronator
- Pronator teres

Spasiticity Management to Improve Motor Planning: BOTOX®

- "There is strong (Level 1a) evidence that treatment with BTX alone or in combination with therapy significantly decreases spasticity in the UE in stroke survivors."
- http://www.ebrsr.com/uploads/Module-10_upper-extremity_001.pdf

- Must think of spasticity as a layer of "unwanted" movement. In most cases, it develops in the flexor muscles of the fingers, wrist, elbow and shoulder as a result of decreased inhibition
- This unwanted layer prohibits any emerging extensor strength from being detected because it is stronger than the emerging movement
- Botox temporarily weakens the injected flexor muscles to remove that unwanted layer → KEY OPPORTUNITY to SRENGTHEN EMERGING EXTENSION

What is BOTOX®? How does it work?

- Botulinumtoxin is a neurotoxin created from Clostridium botulinum that, when combined with saline and injected directly into the hyperactive muscle belly via EMG guidance, binds with acetylcholine receptors to inhibit its release at the NM junction causing a chemical dennervation.

- **BOTOX®** (Onabotulinumtoxin A) is the only FDA-approved botulinumtoxin for UE spasticity: Elbow (biceps), Wrist (FCR, FCU), Fingers (FDS, FDP)
- Dysport (Abobotulinumtoxin A)
- Xeomin (Incobotulinumtoxin A)
- Myobloc (Rimabotulinumtoxin B)

Muscles for Injection

HAND

- Flexor Digitorum Superficialis
- Flexor Digitorum Profundus
- Flexor Pollicis Longus
- Lumbricals

WRIST

- Flexor Carpi Radialis
- Flexor Carpi Ulnaris

FOREARM

- Pronator Teres

ELBOW

- Biceps
- Brachialis
- Brachioradialis

SHOULDER

- Biceps
- Pectoralis
- Teres Minor

Adjuncts to BOTOX®

POSITIONING

- There is consensus (Level 3) opinion that proper positioning of the hemiplegic shoulder helps to avoid subluxation.

  However, there is conflicting (Level 4) evidence that prolonged positioning prevents loss of active or passive range of motion, or reduces pain.

http://www.ebrsr.com/uploads/Module10_upper-extremity_001.pdf

TAPING

- "There is conflicting (Level 4) evidence that strapping the hemiplegic shoulder reduces the development of pain. "
- "There is moderate (Level 1b) evidence that strapping does not improve upper limb function or range of motion."
- http://www.ebrsr.com/uploads/Chapter11_HemiplegicShoulder_FINAL__16ed.pdf

Adjuncts to BOTOX®

STRETCHING

- "There is moderate (Level 1a) evidence that a nurse-led stretching program can help to increase ROM in the UE and reduce pain in the chronic stage of stroke."

- http://www.ebrsr.com/uploads/Module-10_upper-extremity_001.pdf

Adjuncts to BOTOX®

SPLINTING TO IMPROVE HAND FUNCTION

- "There is strong (Level 1a) evidence that hand splinting does not improve impairment or reduce disability"
- Use clinical judgement
- Most studies look at less than 4 weeks of wearing schedule
- http://www.ebrsr.com/uploads/Module-10_upper-extremity_001.pdf

SPLINTING TO REDUCE CONTRACTURE

- "There is strong (Level 1a) evidence that hand splinting does not reduce the development of contracture, nor reduce spasticity"
- Most studies look at 4 weeks of night wearing schedule
- Spasticity can continue to develop up to 18 months post-stroke
- Need to track pain ratings with splint use- would they decrease?

Task Oriented Training

Training of functional tasks wherein:

- Goals are client-centered
- Client is active problem-solver
- Focus is on acquisition of skills
- Tasks are graded and provide optimal challenge
- Real objects are used
- Environment is context-specific
- Repetition is key
- Feedback is provided

Desired outcome is skill

BOTOX® Case Study #1

- 70 year-old male with history of left ischemic MCA 9/2011 with decreased sensation, swallowing, and right HH
- Inpatient rehab (6 wks) → Day Rehab (7 mos)→ Intensive Aphasia (4 wks) → Outpatient (8 wks) → Seizures → DayRehab (4 wks) → Intensive Aphasia (4wks) → DayRehab (5 mos)
- Significant motor planning deficits and spasticity
- MAS 1+ in fingers, wrist; 2 biceps, pecs

Case Study #1 Analysis

- What do you see?
- What do you like about his function?
- What would you want to improve with his function?
- Based on the movement you see, what other functional activities might be affected?
- What muscles do you think you might recommend for possible injection just based on what you see?

Motor Recovery with BOTOX®

Pre-Botox Hand: Chedoke 3

Post-Botox Hand: Chedoke 4

Motor Recovery with BOTOX®

Pre-Botox Arm: Chedoke 2

Post-Botox Arm: Chedoke 3

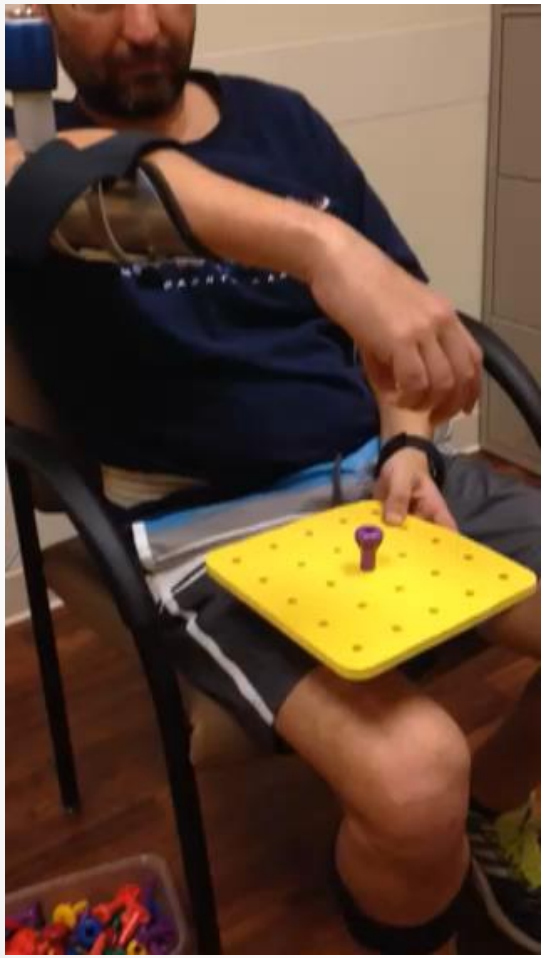
Case Study #1 Follow Up

- What differences do you notice in his motor control?
- How do these improvements in motor control translate into function?
- What other functional goals would you incorporate based on his new level of motor control and strength?
- How would you incorporate task training to improve occupational performance post-BOTOX®?
- Let's go back and watch the post-BOTOX® videos

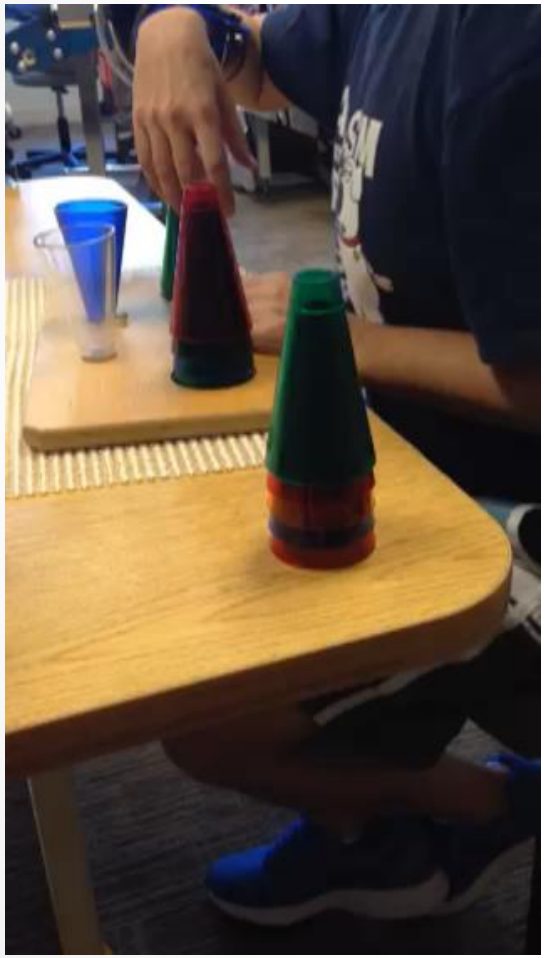
Case Study #2

- 39 y/o, RH male, Entrepreneur
- L MCA in May 2014
- DayRehab 5 full days/week x 4 months
- Apraxia, spasticity, greater muscles weakness, not using hand at all in functional tasks
- MAS: Biceps 2, Finger flexors, 1+ to 2 at times, Wrist flexors 1+
- Goals: Purposeful and controlled muscle activation, controlled reaching for light switches and doors, controlled gross grasp and release

Case Study #2 Pre-Botox



Case Study #2 Post-Botox



Case Study # 2 Follow Up

- Which muscle groups do you think were targeted for injection?
- What functional goals should be incorporated based on decreased spasticity after BOTOX®?
- Amount of muscle strength and functional use varies greatly and should be seriously considered with the patient and family prior to injection.

Research

Randomized, Double-Blinded, Placebo-Controlled Trial

- n=37
- Both groups showed decreased pain scores at 4 wks.
- Significant improvement (P=0.05) in scores for hygiene on the DAS
- Similar trend towards significance on the DAS dressing scale (P=0.061)

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