Learner Objectives:

- Participants will identify various swallow exercises
- Participants will describe various methods of instrumental swallow therapy
- Participants will recognize the benefits of biofeedback use

USE IT OR LOSE IT
A saying to live by...
**BODY**

- Average vacation = little exercise  
  (Or at least restricted exercise)
- Decreased muscle challenge
- Further Deconditioning and/or non-compliance
- Muscle tone loss, fat gain

**SWALLOW**

- Dysphagia = NPO  
  (Or at least restricted PO)
- Decreased swallowing frequency
- Further Deconditioning and/or non-compliance
- Exacerbation of dysfunction

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**20s vs 80s....**

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**Research to Back Up the Obvious**

Inactive adults and those with disease limitations will have added health benefits when they become more active

**Atrophy occurs quickly**

- 4-6 weeks of bed rest results in a 40% decrease in strength, worsening with the ill and elderly.
- Significant atrophy can be evident within 72 hours post-stroke

**Atrophy is reversible**

- Skeletal muscle demonstrates remarkable plasticity in response to functional demand
- Swallow function demonstrates propensity for recovery secondary to neural plasticity and the potential for cortical reorganization after incident.
Basic Muscle Composition

SARCOMERES

MUSCLE FIBERS
Type I: “Slow Twitch”
Type II: “Fast Twitch”
  Type IIa
  Type IIb

WHOLE MUSCLES

How does that apply to the swallow?

• A high concentration of Type I and IIa fibers are found in the anterior tongue

• A high concentration of Type IIb fibers are found in the tongue base and pharyngeal constrictors

Burkhead et al, 2007
What does exercise do?

Modification of nervous system activation

Morphologic changes within the tissue

Fiber type shift

Hypertrophy

Cortical re-organization

Shih & Cohen, 2004; Burkhead et al, 2007; Powers & Howley, 2001

Prophylactic

...it has another meaning

Prophylactic Exercises Establish a Higher Baseline

• Performing pre-treatment swallowing exercises produces measurable improvements in post-treatment swallowing function

• Patients completing a program of swallowing exercises during cancer treatment demonstrated superior muscle maintenance and functional swallowing ability.

Carnaby-Mann et al, 2012; Carroll et al, 2008
What exactly is it?

Exercise is activity that challenges the body beyond its typical state of activity

- Exercise that does not force the neuromuscular system beyond usual activity will not elicit an adaptation
- Resistance training recruiting 60-80% effort is required to achieve the greatest improvement

Themes for Effective Exercise

INTENSITY
Achieved via load, amount, and duration

SPECIFICITY
Focused progress toward a specific goal

TRANSFERENCE
Combined intensity and specificity

Basic exercise frequency

GENERAL HEALTH
Adults should do at least 150 minutes of moderate-intensity (or 75 minutes of vigorous intensity) aerobic physical activity throughout the week.

...about 30 moderate minutes or 15 vigorous minutes 5x/week

MUSCLE MAINTENANCE
• strength training should be done ≥ 2 times/week (non-consecutive days per muscle group)
• With continued exercise at least 1x/week, older individuals who had exercised, maintain both strength and muscle size

Borrowing from Exercise Physiology

To gain muscle strength, a load requiring 60% effort or more is required, increasing to 80% every 2 subsequent weeks

To build endurance 8-12 repetitions at lesser difficulty are required per set

To build strength and power 6-8 repetitions at greater difficulty are required per set


Lazarus et al, 2003; Robbins et al, 2005
Application To Dysphagia
Bring it home...

Basic exercises for dysphagia

Tongue Presses
Effortful Swallow
Mendelsohn Maneuver
Regular Pitch /i/

As your muscles get stronger, they need more of a challenge to keep improving.
So, increase the **challenge** of your patient’s exercises

**Masako**

**Open Mouth Swallow**

Swallowing in an unusual position significantly increases the activation of the swallowing muscles

Burkhead et al, 2007

As they progress, increase the **frequency** of your patient’s exercises

- Beginners should attempt 3-6 “sessions” of at least 5 minute long exercise per day
- Progress slowly, increasing the time of your “sessions” and decreasing the amount of sessions per week

Ballantyne, 2006

Also, add **physical resistance** to your patient’s exercises

- resistance training increases muscle content
- undertaking resistance training in later life counters the physiological and functional losses of physical aging
- aggressive treatment with weight-loaded exercises results in the recovery of strength and work capacity in previously weakened muscles

Kendrick et al, 2007; Henwood & Taffe 2005; Trappe et al, 2002
Therapy Equipment
Tools to help meet your patient’s goals

Iowa Oral Performance Instrument (IOPI)
- lingual elevation
- lingual protrusion
- lingual lateralization
- labial compression

Using the IOPI increases isometric pressure generation as well as oral pressure during swallowing

Neuromuscular Electrical Stimulation (NMES)
- application of electrical stimulation to a group of muscles for stimulation of the motor unit.
- stimulates the natural electrical impulse passed from the brain to the muscular system
- Gives an extra "oomph" by facilitating and stimulating the active effort of exercise
WAIT!
Before any red flags go up...

NMES is not proved beneficial in isolation or for everyone

For NMES to be effective, the nerve innervating the muscle must be intact.

While opinions vary, research across various groups consistently agrees that NMES is not beneficial in isolation.

The most promising group for NMES appears to be the stroke group with a study last year showing significant improvement with the use of NMES along with traditional therapy, as compared to without.

However, uncertainty still exists, particularly with regard to NMES for the H&N population. Be on the look out for results of Langmore et al’s in-progress investigation...

Ludlow, 2013; Wenguang et al, 2011

Expiratory Muscle Strength Training (EMST)

- Improved expiratory driving pressures
- Submental and suprhyoid complex activation

Make sure you have clearance from a RT or MD to challenge the patient’s expiratory strength.

Stretching
A vital part of every workout...

Improves flexibility
Improves range of motion
Proper stretching form involves holding a mild stretch of 10 to 30 seconds while breathing normally

Basic Stretching for dysphagia

gentle neck stretches
gentle oral stretches
Turning it up a notch with Pilates’ theory

Joseph Pilates developed a popular body conditioning routine designed to increase circulation and build flexibility, strength, endurance, and coordination without adding muscle bulk.

The United States Pilates Association

“Dysphagilates”

**Shaker**

**Mendelsohn Maneuver**

Stretching

On a whole other level...
**Muscle tension dysphagia**

Physical traumas, overuse, structural imbalances, and inflammatory processes can all affect the fascia, causing soft-tissue dysfunction (fascial damage)

Secondary effects of radiation therapy is a progressive fibrotic sclerosis of the tissues called "radiation fibrosis"

- Affected tissues can include skin, muscle, ligament, tendon, nerve, viscera, and bone

Curran et al, 2010; Stubblefield et al, 2008

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**Myofascial Release**

Championed by John Barnes (a physical therapist)

Provision of gentle and sustained stretching to

- soften and lengthen fascia
- enhance circulation
- enhance nervous system transmission
- increase range of motion
- decrease pain

Be sure to have physician clearance, as well as proper education and training, prior to initiation of therapy

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**Research to back up the obvious**

Research with regard to myofascial release and swallowing is limited; however...

- Swallowing exercise therapy must target improved or more efficient movement of physiologic impairments in order to be effective.

- myofascial release releases fascia restriction and restores its tissue, easing pressure in the fibrous bands of the fascia

- myofascial release improves function in those with moderate to severe spastic cerebral palsy.

Hutchenson, 2013; Shah & Bhulara, 2012
Lymphedema Therapy

Specially trained lymphedema therapists can provide intervention and relief.

Lymphedema therapy is not in our scope of practice; however, an option to be aware of for our patients.

The National Lymphedema Network; Lymphology Association of America

Trismus

Restricted mouth opening secondary to trauma, surgery, or radiation.

Can range from severe (lock jaw) to mild (slightly decreased opening).

When severe, can drastically affect speech, swallowing, and quality of life.

Trismus Relief

Following along the lines of myofascial release, tools can be utilized to safely achieve passive motion, active resistance, and stretching for restoration of jaw mobility and flexibility.

The DynaSplint & The Therabite are 2 options.

Be sure to have physician clearance, ensuring bone integrity, prior to initiation of this therapy.
Research regarding Trismus Care

• Early use of stretching devices improves mandible mobility with subsequent speech and swallowing improvement
• Use of devices also shows improvement of trismus in patients with late radiation
• Use of a device can provide impressive gain in 6 weeks of therapy
• Multiple comparisons of use of devices in comparison to tongue depressors and fingers show significantly less improvement without the device
• Not only do the devices stretch connective tissue to improve trismus, but also improves mobilization of the temporomandibular joint, further reducing pain and tightness

Hutchenson 2015; Bensadoun et al., 2010; Baranano et al., 2011; The Oral Cancer Foundation

Biofeedback

Biofeedback examples

• IOPI
• sEMG
• Endoscopic Biofeedback
• Progress Chart
IOPI Biofeedback

The visual cue (green light moving upward) helps motivate patients.

In addition to motivation, it helps them to understand the effects of their application of pressure to the tongue bulb.

As previously discussed, set goal target at ≤60% of average maximum.

Surface Electromyography (sEMG)

Electrical signals, upon muscle contraction, are measured via sensors placed on the surface of the body.

Teaches control and challenges effort.

Again, as mentioned, set the goal at ≤60% of average maximum.

Endoscopic biofeedback

Have the patient practice techniques while showing them images from the monitor to help hone their ability.

Is also useful to help patients understand rationale for diet recommendations.

Save pre-therapy swallow evaluations to compare with post-therapy evaluations.
Progress Chart

Record evaluation and re-evaluation results

Note when exercise regimes were started, so their effects can be considered

Use this for your feedback as well as theirs (adjust your plans as indicated)

MBSimp

Modified Barium Swallow Impairment Profile, created by Bonnie Martin-Harris, PhD, CCC-SLP

A great way to show progress across studies, even if patient moves from clinician to clinician

The computer images can also be useful to help your patients understand “normal swallows” and the end goals

Goals

The stepping stones to success
Setting Goals

• Can you reach your end goal today? (i.e. regular diet, no restrictions?)
• Can you even reach an intense workout for that goal today? (i.e. 100% of max ability?)

Set a reasonable goal

• Set a bite size goal today (ex. PO trials of puree)
• Set a doable workout today (ex. 60% of max ability)

Specificity

• Make your goals specific to the end task (i.e., to eating)
• Solely completing exercises in isolation will not engage the entire group muscle action required for swallowing
• The focus on your patient’s improvement towards PO should consider the comprehensive process and goal
Coach
Bringing out the best

Motivate your patients!

• Encourage your patients!

• Push your patients towards success

• Celebrate every victory

• Stay sharp, with each patient

THANK YOU