Oropharyngeal Strengthening for Swallowing Rehabilitation

Jacqueline Hind, MS, CCC-SLP, BCS-S
Identifying the Optimal
Oropharyngeal Strengthening Protocol for Your Patient

Identifying the optimal protocol for oropharyngeal strengthening is dependent on patient needs and therapy goals. Understanding basic skeletal muscle physiology and strengthening principles will guide clinicians in developing an optimal therapy plan.

Oropharyngeal muscle fiber types:

**Type I (slow twitch):** Slower to contract, more resistant to fatigue; lower capacity for force generation; smaller in diameter; more predominant in the anterior tongue for rapid, repetitive low force movements.

**Type II (fast twitch):** Faster to contract; less resistant to fatigue; higher capacity for force generation; larger in diameter; more predominant in the base of tongue and pharyngeal constrictors where more force is required.

**Principles of Strength Training**

**Resistive Load:** Tasks must exceed usual levels of activity; defined as pressure targets that are a percentage of the maximum; must be progressively adjusted every few weeks to build strength.

**Repetition:** Repetitions (reps) refer to the number of times an individual performs a task. There is an inverse relationship between intensity and repetitions, indicating that as the intensity increases the repetitions should decrease.

**Sets:** Sets refer to how many times the patient repeats the prescribed number of repetitions.

**Frequency:** Frequency refers to how often a patient completes the prescribed sets. Muscle fiber requires a rest day to recover and build. Strength training on the same muscle groups every day is less beneficial than every other day.

**Maintenance:** Significant decreases in strength gains can occur in only a few weeks following training. Continued strength training one time per week has been shown to maintain strength.

<table>
<thead>
<tr>
<th>Clinical Concern</th>
<th>Goal</th>
<th>Load</th>
<th>Repetitions</th>
<th>Sets</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue during mealtime (s/s of aspiration toward end of meal; weight loss)</td>
<td>Increased strength</td>
<td>High (80% of max)</td>
<td>Low (6-8)</td>
<td>1-2</td>
<td>Alternating Days</td>
</tr>
<tr>
<td>General weakness (s/s of aspiration with any intake and/or after swallowing)</td>
<td>Increased strength and endurance</td>
<td>Medium (60% of max)</td>
<td>High (8-12)</td>
<td>2-3</td>
<td>Alternating Days</td>
</tr>
</tbody>
</table>


Clinical Criteria for Patient Selection for Lingual Strengthening Using the SwallowSTRONG Device

**Optimal Patients**

- Swallowing physiology (one or more)
  - Oral stasis
  - Coughing/choking at mealtime
  - Instrumental observation of aspiration/deep penetration with food or liquids or pharyngeal stasis
- Populations
  - Frail
  - Post-stroke
  - Other neuro – non-degenerative
  - Recently diagnosed head and neck cancer
- Diet
  - Modified diet

**Potential Patients Secondary to Clinical Judgment**

- Swallowing physiology (one or more)
  - Oral stasis
  - Pharyngeal stasis
  - Coughing/choking at mealtime
  - Instrumental observation of aspiration or deep penetration with food or liquids
  - Inconsistent secretion management
- Populations
  - Frail
  - Post-stroke
  - Parkinson’s disease
  - Mild dementia
- Diet
  - Modified diet
  - Non-oral intake

**Inappropriate Patients**

- Swallowing physiology (one or more)
  - No spontaneous swallow of secretions
  - Inability to move tongue on command
- Cognition
  - Inability to follow command
- Populations
  - Long-term HNC with significant fibrosis on g-tube
  - Severe dementia
- Diet
  - Long-term non-oral intake
**Functional Oral Intake Scale (FOIS)**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Nothing by mouth</td>
</tr>
<tr>
<td>Level 2</td>
<td>Tube dependent with minimal attempts of food or liquid</td>
</tr>
<tr>
<td>Level 3</td>
<td>Tube dependent with consistent oral intake of food or liquid</td>
</tr>
<tr>
<td>Level 4</td>
<td>Total oral diet of a single consistency</td>
</tr>
<tr>
<td>Level 5</td>
<td>Total oral diet with multiple consistencies, but requiring special preparation or compensations</td>
</tr>
<tr>
<td>Level 6</td>
<td>Total oral diet with multiple consistencies without special preparation, but with specific food limitation.</td>
</tr>
<tr>
<td>Level 7</td>
<td>Total oral diet with no restrictions</td>
</tr>
</tbody>
</table>

Michael A. Crary, PhD, Giselle D. Carnaby Mann, PhD, MPH, Michael E. Groher, PhD
Initial Psychometric Assessment of a Functional Oral Intake Scale for Dysphagia in Stroke Patients
Arch of Phys Med and Rehabil (2005) 86:8, 1516–1520
Evolution of Clinical Studies on the Use of Device-Assisted Oropharyngeal Strengthening

Since 2007, successive studies have demonstrated the effectiveness of device-assisted oropharyngeal strengthening (DAOS), beginning with smaller studies and expanding to larger, controlled studies. Each of the outcomes shown in the table are metrics for effectiveness of dysphagia treatment that are well established in the published literature.

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Journal</th>
<th>Design</th>
<th>n</th>
<th>Population</th>
<th>Outcomes</th>
<th>Key Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Robbins et al⁴</td>
<td>Arch Phys Med Rehabil</td>
<td>cohort</td>
<td>10</td>
<td>stroke</td>
<td>Increased lingual strength</td>
<td>Y</td>
</tr>
<tr>
<td>2008</td>
<td>Yeates et al⁵</td>
<td>Clin Interv Aging</td>
<td>case series</td>
<td>3</td>
<td>stroke, tumor, brain injury</td>
<td>Safe bolus flow</td>
<td>Y</td>
</tr>
<tr>
<td>2013</td>
<td>Argolo et al⁶</td>
<td>Neuro- Rehabil</td>
<td>cohort</td>
<td>15</td>
<td>Parkinson’s disease</td>
<td>Decreased aspiration</td>
<td>NR</td>
</tr>
<tr>
<td>2013</td>
<td>Steele et al⁷</td>
<td>Int J Speech Lang Pathol</td>
<td>case series</td>
<td>6</td>
<td>brain injury</td>
<td>Decreased residue</td>
<td>Y</td>
</tr>
<tr>
<td>2015</td>
<td>Park et al⁸</td>
<td>J Phys Ther Sci</td>
<td>RCT</td>
<td>50</td>
<td>stroke</td>
<td>Improved QOL</td>
<td>Y</td>
</tr>
<tr>
<td>2016</td>
<td>Malandraki et al⁹</td>
<td>Arch Phys Med Rehabil</td>
<td>cohort</td>
<td>10</td>
<td>neurologic injury/insult</td>
<td>Less restrictive diet</td>
<td>Y</td>
</tr>
<tr>
<td>2016</td>
<td>Steele et al¹⁰</td>
<td>Dysphagia</td>
<td>RCT</td>
<td>14</td>
<td>stroke</td>
<td>Reduced hospitalization</td>
<td>Y</td>
</tr>
<tr>
<td>2016</td>
<td>Rogus-Pulia et al¹¹</td>
<td>J Am Geriatr Soc</td>
<td>A-B</td>
<td>56</td>
<td>variety of etiologies</td>
<td>Reduced feeding tube</td>
<td>Y</td>
</tr>
<tr>
<td>2017</td>
<td>Kim et al¹²</td>
<td>J Oral Rehabil</td>
<td>RCT</td>
<td>35</td>
<td>stroke</td>
<td>VDS improvement</td>
<td>Y</td>
</tr>
</tbody>
</table>
SwallowSTRONG Data Collection

Diagnosis: ________________________________

Age: _____  Sex: M or F  (Circle One)  Cognitive Score: (if available)____________________

Swallowing Deficits: ________________________________

Pre-Therapy (date: ________)

Diet:
Solids ______________________________________
Liquids ______________________________________
Functional Oral intake Scale: ______
Pressure
Front sensor Therapy Max: ______
Right sensor Therapy Max: ______
Left sensor Therapy Max: ______
Back sensor Therapy Max: ______

Post-Therapy (date: ________)

Diet:
Solids ______________________________________
Liquids ______________________________________
Functional Oral intake Scale: ______
Pressure
Front sensor Therapy Max: ______
Right sensor Therapy Max: ______
Left sensor Therapy Max: ______
Back sensor Therapy Max: ______

Baseline: _____% Intelligibility  Post Therapy: _____% intelligibility

Comments:
____________________________________________________________________________________________
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____________________________________________________________________________________________
____________________________________________________________________________________________

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Swallow Strong, Swallow Safe: Oropharyngeal Strengthening for Swallowing Rehabilitation
Jacqueline Hind
2-2-2017

References:


40. Tracy, Julie F., Jeri A. Logemann, Peter J. Kahrilas, Pothen Jacob, Mindy Kobara, and Christine


Clinical Scenario 1:
An 87-year-old female is referred to you for swallowing evaluation and treatment secondary to coughing at mealtime observed by staff at the assisted living facility in which she resides. She has seemed more tired lately, but other than that has been attending her regular schedule of engagements (bingo, church etc.).

1) What's your next step?

2) What additional information do you want to gather?

3) Is there anyone else you want to include in your information gathering or decision-making?

Clinical Scenario 2:
You work in a post-acute environment and have been treating a patient for dysphagia secondary to a stroke that occurred 3 months ago. When he was discharged from the hospital to your facility, the recommendations were for honey-thick liquids and a left head turn. You began oropharyngeal strengthening in addition to the modified diet and now you think he may be ready for a diet upgrade. You refer him for a videofluoroscopic swallowing evaluation at the local hospital and receive the following information upon his return:

“Patient failed swallowing study secondary to aspiration with thin liquids. Continue current diet of honey-thick liquids.”

1) What additional information do you want?

2) What could you have done before the study to facilitate getting more information?