Help patients swallow stronger and safer with **SwallowSTRONG**®

Clinical evidence supports oropharyngeal strengthening as an effective standard of care to improve swallowing in patients with dysphagia. SwallowSTRONG makes strengthening simple, engaging, and quantifiable.

SwallowSolutions
swallowsolutions.com
608-238-6678
Dysphagia is a swallowing disorder that is growing more common with our aging population. It is estimated that 22% of adults above the age of 50 and 55% of those within institutional settings suffer from dysphagia.1

Dysphagia is commonly caused by weak lingual musculature—often as the result of stroke, neurodegenerative disorders or head and neck cancer.2, 3

Dysphagia leads to aspiration pneumonia and the need for invasive treatments such as feeding tubes and dietary modifications.4-6

### Dysphagia causes and effects

**Dysphagia following stroke leads to aspiration**

<table>
<thead>
<tr>
<th>Assessment I</th>
<th>S. Penetration</th>
<th>Neither</th>
<th>No VF</th>
<th>Aspiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetration</td>
<td>8</td>
<td>24</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Neither</td>
<td>3</td>
<td>10</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>No VF</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>44</td>
<td>30</td>
<td>8</td>
</tr>
</tbody>
</table>

VF = videofluoroscopy (n=103)

**Dysphagia is a leading predictor of aspiration pneumonia**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suctioning</td>
<td>2.55 (2.06, 3.15)</td>
</tr>
<tr>
<td>COPD</td>
<td>2.49 (2.27, 2.72)</td>
</tr>
<tr>
<td>CHF</td>
<td>1.75 (1.61, 1.90)</td>
</tr>
<tr>
<td>Case Mix Index</td>
<td>1.67 (1.55, 1.79)</td>
</tr>
<tr>
<td>Indicators of Delirium/Less Alert</td>
<td>1.63 (1.38, 1.92)</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>1.60 (1.47, 1.74)</td>
</tr>
<tr>
<td><strong>Swallowing Problem/Dysphagia</strong></td>
<td><strong>1.46 (1.31, 1.62)</strong></td>
</tr>
</tbody>
</table>

Logistic regression model with backward elimination procedure identifying 18 statistically significant predictors of aspiration pneumonia (n=102,755)

### Dysphagia leads to aspiration pneumonia, which is a major cause of hospital readmissions

<table>
<thead>
<tr>
<th>Incident Rate: Readmissions/100 Person-Years (95% CI)</th>
<th>Attributable Risk: Readmissions/100 Person-Years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Readmissions</td>
<td></td>
</tr>
<tr>
<td>No Dysphagia</td>
<td>90.7 (87.3, 94.2)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>95.5 (91.1, 99.9)</td>
</tr>
<tr>
<td></td>
<td>4.75 (~0.87, 10.36)</td>
</tr>
<tr>
<td>Readmissions for Aspiration Pneumonia</td>
<td></td>
</tr>
<tr>
<td>No Dysphagia</td>
<td>0.45 (0.21, 0.69)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>2.3 (1.6, 3.0)</td>
</tr>
<tr>
<td></td>
<td>1.83 (1.11, 2.56)</td>
</tr>
</tbody>
</table>

Independent variables odds ratio measures of effect and impact based on incidence rates of hospital readmission, according to oropharyngeal dysphagia status (n=2,359)

Accounts for 13% to 48% of all infections in nursing home residents.5

Second most common type of nosocomial infection in hospitalized patients.5

Overall mortality rate ranges from 20% to 50% with rates as high as 80% reported.5
**Lingual strengthening for improved health and quality of life**

**Lingual strengthening reduces penetration-aspiration scale scores in stroke patients with dysphagia and improves swallowing safety**[^7]

- Increased isometric pressure
- Increased maximum swallowing pressure
- Increased swallowing safety

**Lingual strengthening improves outcomes for head and neck cancer patients**[^8-10]

- Diet maintenance improves over the long term[^8]
- Lingual strengthening before chemoradiation improves swallowing function[^9]
- Patients who complete swallowing therapy are less likely to worsen their diet or receive a feeding tube[^10]

**Improved quality of life**[^7]

- Greater happiness and social engagement
- Decreased swallowing burden
- Elevated energy level

[^7]: Improved quality of life

[^8-10]: Lingual strengthening reduces penetration-aspiration scale scores in stroke patients with dysphagia and improves swallowing safety
Take dysphagia therapy to the next level with SwallowSTRONG

SwallowSTRONG is designed to make rehab more efficient and effective for both the speech language pathologist and the patient. A custom-molded mouthpiece, a tablet and easy-to-use software work together to implement the evidence-based isometric progressive resistance oropharyngeal therapy regimen—which improves lingual strength.

- Sensors in the mouthpiece measure pressure at four distinct locations of the tongue. This allows the clinician to tailor therapy to the patient’s specific needs, including placing focus on weak back of tongue and/or unilateral lingual paresis.
- Custom-molded mouthpiece ensures sensor placement is the same in each therapy session, making for repeatable, reliable results.
- Easy-to-use electronic interface indicates performance levels and automatically calculates therapy targets.

“The interface is very user-friendly... the fact that the mouthpiece is custom-fitted in just minutes and does not easily dislodge during usage helps to ensure ease and accuracy of placement, so that objective results obtained are reliable.

Kathy Groves Wright, PhD, CCC-SLP, BCS-S
Cincinnati, VA Medical Center
**SwallowSTRONG makes it easy to develop objective therapeutic goals with quantifiable outcomes**

- **SwallowSTRONG software provides easy-to-understand knowledge of performance and results for both the patient and the clinician.** Feedback includes specific information about accuracy of the movement as well as overall performance. Positive feedback facilitates and increases motivation.\(^\text{11}\)

- **SwallowSTRONG provides quantification of therapy progress and results.** The Centers for Medicare and Medicaid Services (CMS) and other payers require such objective documentation for reimbursement. Claims without sufficient objective data may be denied.\(^\text{12}\)

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**I-PRO therapy with SwallowSTRONG**

Isometric progressive resistance oropharyngeal (I-PRO) therapy is practiced for improved swallowing function. It involves an active application of pressure by the tongue against stable resistance in the mouth.

**STANDARD PROTOCOL**

- **10 lingual presses** per sensor
- **3 times** a day
- **3 days** a week
- **8 weeks**

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**Patient Details**

**Patient Therapy History**

<table>
<thead>
<tr>
<th>Therapy Date/Time</th>
<th>Sensor</th>
<th>Target MPa</th>
<th>Target Duration (sec)</th>
<th>Repetitions</th>
<th>Success %</th>
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</thead>
<tbody>
<tr>
<td>Fri Oct 10 14:00:59 CST 2014</td>
<td>Left</td>
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</tr>
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</table>

**Close**
SwallowSTRONG Management System

SwallowSTRONG Management System (SSMS) is a cloud-based system that enables clinicians to:

- Remotely view patients’ progress and reports.
- Monitor adherence.
- Remotely adjust therapy parameters.
- Download therapy data for analysis and report writing.

No matter where the patient “travels” in the care path, the SwallowSTRONG data targets and results will be available to the clinician.

Transfer data from one facility to another facility.

Clinicians can view and adjust data from any web-enabled device.

Compliance with the Health Insurance Portability and Accountability Act (HIPAA):

No protected health information (PHI) is collected or stored on the tablet or SSMS.

A code is assigned by the software and linked to the mouthpiece serial number.
**Swallow Solutions Case Study**

**Device Helps Patient Regain Ability to Swallow After Two Years on Feeding Tube**

JB, a 56-year-old female, suffered a brainstem stroke, which left her unable to swallow and dependent on gastrostomy tube feeding for two years. She arrived at a university hospital taking all nutrition via feeding tube and expectorating secretions into a spittoon.

The clinical staff carefully evaluated JB and determined that she had diminished tongue strength and would be a good candidate for oropharyngeal strengthening. JB initiated isometric progressive resistance oropharyngeal (I-PRO) therapy and proved to be a dedicated, hard-working patient who completed the lingual presses faithfully 3 times a day, 3 days per week.

JB first began taking small sips of liquid by mouth and ultimately progressed to full oral intake of a general diet. She reports that the day she had her feeding tube removed was “one of the best days.” “It’s so isolating to not swallow. It adds hours to your day. You can’t go out with friends, have a quick snack or share a meal with family. Now I eat well, I sleep well and I can fully enjoy my time spent with friends and family.”

“It’s so isolating to not swallow... Now I eat well, I sleep well and I can fully enjoy my time spent with friends and family.”

**Challenge**—JB spent the prior two years trying “every therapy known to man,” including swallow-specific maneuvers such as the Mendelsohn maneuver, electrical stimulation and repeated dilations of the upper esophageal sphincter (UES) with no appreciable gains in swallowing. Videofluoroscopic evaluation showed severely reduced (almost non-existent) opening of the UES, significant post-swallow residue in the pyriform sinuses and aspiration on all consistencies.

**Results**—Findings after 8 weeks of I-PRO therapy were progression to general oral diet, 15 lb. weight gain, increased isometric pressures ($\Delta > 16$ kPa) with transference to swallowing pressures, increased lingual volume (8.3%), reduced pharyngeal wall residue ($P=0.03$), increased pharyngeal pressures ($\Delta > 43$ mm Hg) and increased UES opening (nadir) pressures ($\Delta > 9$ mm Hg) with improved time-pressure coordination across the pharynx, and improved quality of life. After detraining, decreased isometric pressures and reduced UES opening were noted. After I-PRO maintenance, isometric anterior lingual pressures returned to levels noted after the 8 weeks of intervention.

**Conclusion**—I-PRO therapy, facilitated by the Swallow Solutions device combined with instrumental UES dilation, improved swallow safety, increased dietary intake, and facilitated UES opening while enriching quality of life.
About Swallow Solutions

Swallow Solutions is dedicated to the advancement of the health and quality of life of patients with swallowing disorders. Swallow Solutions was founded in 2004 by Dr. JoAnne Robbins, PhD, a professor at the University of Wisconsin School of Medicine.

For more information on Swallow Solutions or the SwallowSTRONG device, visit swallowsolutions.com.

SwallowSTRONG

Contact Swallow Solutions to secure pricing for individual and multiple purchases as well as for information on any new products being introduced.

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