

Swallowing Dysfunction: Interventions

Swallowing problems in elderly adults leads to pneumonia. Unless underlying disordered swallowing is treated, pneumonia will recur. We evaluated low-cost, non-invasive interventions that reduced health care costs and improved health and quality of life.

Lead Agency:

US Department of Veterans Affairs (VA); Veterans Health Administration (VHA)
William S. Middleton Memorial VA Hospital, Madison, WI, Geriatric Research Education and Clinical Center

Agency Mission:

"To care for him who shall have borne the battle and for his widow and his orphan."

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University of Wisconsin – Madison
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University of Miami
University of Tennessee – Memphis

General Description:

Swallowing disorders (dysphagia) are linked to increased sickness and death. About 18 million adults will require care for dysphagia and related conditions (malnutrition, pneumonia, and reduced quality of life) by 2010 (see "Other References" on Page 7; 1-3). Patients with dysphagia are at greater risk for pneumonia, the fifth leading cause of infectious death in the U.S. among persons over 65 and the third leading cause of death over 85 years of age (4). A single hospital admission for pneumonia costs ~\$7,200 (5). To address the devastating impact of dysphagia on health, quality of life, and healthcare costs in older adults, the Madison GRECC has a multi-pronged research effort underway.

"Short- and Long-term Effects of Two Interventions for Liquid Aspiration" focused on patients with Alzheimer's (AD) or Parkinson's disease (PD), both of which often lead to dysphagia. Overall, 70-80% of AD patients and ~50 percent of those with PD suffer from dysphagia, and pneumonia is a common cause of their death (1). A challenge in managing their dysphagia is the high incidence of silent aspiration (no outward sign such as coughing) which renders patients incapable of protecting themselves by automatically clearing the airway or alerting health care providers. In such patients, effective strategies for preventing aspiration are particularly important—but the common strategies--drinking thickened liquids (nectar- or honey-thick) instead of thin liquids (such as water, coffee, tea); or tucking the chin down when swallowing--have never been tested. Their effectiveness was evaluated in a large study of patients with AD or PD. Patients who aspirated on thin liquids (seen on x-ray studies using barium) were randomly assigned to drink nectar-thick (n=133) or honey-thick (n=123) liquids in a head-neutral position or all liquids in a chin-down posture (n=259). Pneumonia arose in 11 percent of subjects, but this rate was much lower than the 20-40 percent reported in elderly patients with dementia or PD or stroke residing in nursing homes. Patients drinking nectar-thick liquids had less pneumonia than those drinking honey-thick liquids. Also, honey-thick patients who got pneumonia had longer hospital stays (4 days [chin tuck], 6 days [nectar] vs. 18 days [honey]).

"Rehabilitation Exercise for Dysphagia After Stroke" focused on patients with dysphagia after stroke, who face risk of death from pneumonia, malnutrition and dehydration. Stroke survivors with dysphagia require longer hospital stays and nursing home placements and have diminished rehabilitation potential. The effect of muscle strength on stroke recovery has been shown in studies of limb muscles, but the link between mouth and throat muscle strength and swallowing outcomes has received little attention. Stroke patients aged 51-90 underwent 8 weeks of tongue exercises. Aspiration was reduced for liquids, and two stroke patients showed increased tongue volume, reflecting the possibility that the tongue exercises built muscle mass in addition to increasing strength. This work has already generated two patents (U.S. #6702765 and U.S. #7238145) development is underway of two exercise devices with biofeedback for intraoral muscle strengthening.

Excellence: *What makes this project exceptional?*

"Short- and Long-Term Effects of Two Interventions for Liquid Aspiration" was the largest multi-site, randomized clinical trial ever funded by the NIH in the area of swallowing and swallowing disorders. This decade-long trial included participation of seven acute care hospitals,

79 subacute residential facilities, and over 300 clinicians to enroll 711 men and women with dementia and/or PD. “*Rehabilitation Exercise for Dysphagia After Stroke*” questioned the standard practice for dysphagia treatment in elders (e.g., limiting intake to materials requiring less tongue strength for swallowing). This study showed positive changes in strength after stroke patients performed 8 weeks of relatively rigorous progressive resistance exercises. Improved isometric strength corresponded with *spontaneous increased pressure generation during swallowing* despite the fact that the coordinated, functional act of swallowing was not practiced. Findings of effective dysphagia treatment with low-cost, non-invasive exercise programs will change routine clinical practice with stroke and more generally geriatric dysphagic patients. Doing so may not only reduce health care costs for dysphagia, but also will lead to improvements in patient health and quality of life and has enormous implications for prevention of life-threatening aspiration and dysphagia.

Significance: ***How is this research relevant to older persons, populations and/or an aging society?***

Swallowing disorders are most common in older adults and are associated with aspiration pneumonia, a leading cause of death in the US in persons over age 65. Rates of hospital discharge for Medicare beneficiaries with pneumonia as a primary diagnosis have increased by 93.5 percent in the past decade along with length of stay and death rates. While previous studies have provided a basis for widespread clinical use of chin-down posture or thickened liquid to minimize or eliminate aspiration, none included long-term health outcome data. The findings will prompt clinicians to value the importance of long-term health outcomes and to question common practices for dysphagia intervention. The findings of spontaneous carryover of isometric strengthening exercise to improved swallowing function will change rehabilitation practices with elders and will influence future study of neural plasticity, the mechanism by which the damaged brain reclaims “lost behavior” in response to rehabilitation. Overall, this research effort demonstrates the importance of consideration of the relative burden of swallowing dysfunction on patients and care providers, not just in terms of health care costs, but also quality of life.

Effectiveness: ***What is the impact and/or application of this research to older persons?***

As the geriatric population increases, the need for effective, evidence based treatments will become even more critical. The results from the large multi-site randomized clinical trial will guide daily clinical care for elders and ultimately decrease dysphagia related health consequences such as pneumonia and malnutrition and improve quality of life. And the patients who experienced significantly improved tongue strength also demonstrated improved swallowing function and dysphagia-specific quality of life measures, with reported changes in their social lives and dietary intake. Findings that exercise of head and neck muscles improves swallowing in elders will motivate rehabilitation in new empowering directions for older persons. Perhaps even more important is the potential such exercise, strengthening and muscle mass building has for preventing swallowing problems in this growing at-risk population.

Innovativeness: ***Why is this research exciting or newsworthy?***

“Short- and Long-Term Effects of Two Interventions for Liquid Aspiration” was the largest multi-site randomized clinical trial ever in the area of dysphagia. It demonstrated unique and successful collaboration between the National Institutes of Health, VA, and industry partners. Its findings emphasized the need for careful evaluation of practices that have become routine (e.g., thickening liquids has evolved into a multimillion dollar industry) without evidence to support them. It resulted in US patent #6461589 issued to the Wisconsin Alumni Research Foundation (WARF) which has become the standard used in videofluorography to diagnose swallowing disorders. *“Rehabilitation Exercise for Dysphagia After Stroke”* demonstrated that persons with post-stroke swallowing disorders not only are capable of performing and benefiting from tongue exercises but also are enthusiastic about doing so. In so doing, it provides a basis for developing active exercise interventions as a complement to more traditional treatments.