Prevention of Pneumonia in Elderly Stroke Patients by Systematic Diagnosis and Treatment of Dysphagia: An Evidence-Based Comprehensive Analysis of the Literature

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Abstract. We conducted a systematic literature review and analysis of programs for evaluating swallowing in order to prevent aspiration pneumonia. This article derives from an evidence report on diagnosis and treatment of swallowing disorders (dysphagia) in acute-care stroke patients prepared by us as an Evidence-based Practice Center (EPC) under contract to the U.S. Agency for Healthcare Research and Quality (AHRQ). Available evidence on the diagnosis and treatment of dysphagia for preventing pneumonia is limited. We found reported pneumonia rates in one historical controlled study of a program using bedside exams (BSE) for acute stroke patients; one uncontrolled case series study of acute stroke patient-reporting of swallowing difficulty; one controlled case series study of videofluoroscopic study of swallowing (VFSS) for acute stroke patients; and one historical controlled study of fiberoptic endoscopic examination of swallowing (FEES) for patients referred for swallowing evaluation in rehabilitation centers. Comparing these results with historical controls indicates that implementation of dysphagia programs is accompanied by substantial reductions in pneumonia rates. While all these methods appeared effective, the small sizes of available studies did not allow determination of the relative efficacy of BSE, VFSS, or FEES.

Key words: Pneumonia — Dysphagia — Stroke — Systematic review — Bedside exam — videofluoroscopy — Fiberoptic endoscopy — Deglutition — Deglutition disorders.

Dysphagia is commonly associated with several neurological disorders. Oropharyngeal dysphagia can lead to aspiration pneumonia if it results in leakage of food, drink, or oral secretions into the lungs (aspiration). Aspiration pneumonia can be fatal, and the elderly are at particular risk for death. Dysphagia can also be serious if the patient is unable to eat enough food to maintain a healthy weight. Malnutrition may occur if the problem is not diagnosed correctly, and malnutrition in turn can weaken the immune system, leaving the patient susceptible to illness. In addition, patients with dysphagia may suffer from dehydration. At a minimum, dysphagia is likely to reduce quality of life.

The magnitude of the health problems posed to society because of dysphagia and aspiration is difficult to determine. This is because information on the incidence and prevalence of dysphagia is sparse and, as we discussed in our larger report on this subject [1], computing the incidence and prevalence of dysphagia is not possible. Rather, one can only approximate diagnosed occurrence and, even here, precise data are not available. Therefore, to estimate the incidence of diagnosed dysphagia, we performed a large number of original calculations based on existing data [1]. From these calculations, we estimated that approximately 300,000 to 600,000 people per year are affected by dysphagia resulting from neurologic disorders (the width of this range speaks to the imprecision of our calculations). Only about 51,000 of these cases are from neurological disorders other than stroke. Based on data from the stroke literature, we estimated that approximately 43% to 54% of stroke patients with dysphagia experience aspiration, approximately 37% of these patients will develop pneumonia, and 3.8% of these will die of pneumonia if they are not part of a
dysphagia diagnosis and treatment program. Up to 48% of all acute-care stroke patients with dysphagia will experience malnutrition.

Oropharyngeal dysphagia is commonly detected with simple preliminary bedside exams (BSE) performed by admitting physicians or nurses. These exams are often followed by a more comprehensive and formal bedside exam (a full BSE) or videofluoroscopic swallowing study (VFSS; the most common variant of which is the modified barium swallow or MBS). Recently, other diagnostic methods have become available, including several variants of fiberoptic endoscopy. Treatments for dysphagia include both noninvasive therapies such as diet modification and swallow therapy, and invasive therapies such as percutaneous endoscopic gastrostomy (PEG) performed by physicians. PEG is the most common invasive intervention for neurogenic oropharyngeal dysphagia and is often used when dysphagia and aspiration are serious enough to be life threatening. However, this article deals only with noninvasive treatments. Finally, we stress that the procedures described above are not necessarily performed in the order in which we have described them. For example, a full BSE or MBS may be carried out without a preliminary BSE, or a PEG may be instituted on the basis of a preliminary BSE without a full BSE or instrumented exam.

The approach we present here adheres to principles of evidence-based medicine (EBM). EBM, in its broadest application, seeks to identify, evaluate, and synthesize the available evidence on any given practice. As such, EBM involves the explicit use of current best evidence in making decisions about the care of patients. Evidence from well-designed randomized controlled trials (RCTs) is usually taken as the best form of evidence, followed by evidence from other types of controlled trials and then by evidence from uncontrolled trials. Expert opinion is usually regarded as the weakest form of evidence.

Evidence for EBM is often obtained through the process of conducting a systematic literature review. Systematic literature reviews differ from traditional reviews in that the former are conducted according to rigorous protocols; the information they seek is based on comprehensive and reproducible search strategies, and what information they consider is determined according to a priori criteria. Systematic literature reviews also involve a systematic evaluation of the quality of the available evidence and often contain meta-analyses or other de novo statistical analyses. Systematic literature reviews are thus more closely related to original research than to traditional literature reviews. In situations where well-controlled studies have not been published, a systematic review may not provide the definitive information required for an evidence-based medicine decision; nevertheless, a valuable service can be provided by describing any tendencies in existing evidence and by pointing out the deficiencies in the literature that need to be addressed by future studies.

Typically, systematic literature reviews examine patient-oriented outcomes rather than intermediate or surrogate outcomes. For example, a systematic literature review of a treatment for osteoporosis might examine the effect of that treatment on bone fracture rates and quality of life rather than the effect of that treatment on bone mineral density. Patient-oriented outcomes are examined because they are generally of greater interest to patients and their caregivers than are other types of outcomes. Well-conducted systematic literature reviews examine an outcome other than a patient-oriented outcome on only those rare occasions when a clearcut relationship between an intermediate or a surrogate outcome and a patient-oriented outcome has been established. For example, a well-conducted systematic literature review of a treatment for diabetes could examine the impact of that treatment on glycosylated hemoglobin level as opposed to the patient-oriented outcomes of morbidity, mortality and quality of life.

This article addresses three issues: (1) whether use of noninstrumented exams in an acute stroke dysphagia program reduces pneumonia rates, (2) whether use of VFSS in an acute stroke dysphagia program reduces pneumonia rates, and (3) whether use of FEES in a dysphagia program in the rehabilitation setting reduces pneumonia rates. It is based on a larger evidence report prepared under contract to the U.S. Agency for Health Care Policy and Research (AHCPR), now named Agency for Healthcare Research and Quality (AHRQ) [1].

Through its Evidence-based Practice Centers (EPCs), AHRQ sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of healthcare in the United States. These reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and healthcare technologies. The EPCs work with partner organizations with interest or expertise in their topics, and the reports undergo peer review prior to their release. ECRI is a nonprofit private health services research organization designated by AHRQ as one of its 12 Evidence-based Practice Centers. It is also a Collaborating Center of the World Health Organization.