Early Dysphagia Screening by Trained Nurses Reduces Pneumonia Rate in Stroke Patients

A Clinical Intervention Study

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Background and Purpose—Dysphagia is a common stroke symptom and leads to serious complications such as aspiration and pneumonia. Early dysphagia screening can reduce these complications. In many hospitals, dysphagia screening is performed by speech–language therapists who are often not available on weekends/holidays, which results in delayed dysphagia assessment.

Methods—We trained the nurses of our neurological department to perform formal dysphagia screening in every acute stroke patient by using the Gugging Swallowing Screen. The impact of a 24/7 dysphagia screening (intervention) over swallowing assessment by speech–language therapists during regular working hours only was compared in two 5-month periods with time to dysphagia screening, pneumonia rate, and length of hospitalization as outcome variables.

Results—Overall, 384 patients (mean age, 72.3±13.7 years; median National Institutes of Health Stroke Scale score of 3) were included in the study. Both groups (pre-intervention, n=198 versus post-intervention, n=186) were comparable regarding age, sex, and stroke severity. Time to dysphagia screening was significantly reduced in the intervention group (median, 7 hours; range, 1–69 hours) compared with the control group (median, 20 hours; range, 1–183; P=0.001). Patients in the intervention group had a lower rate of pneumonia (3.8% versus 11.6%; P=0.004) and also a reduced length of hospital stay (median, 8 days; range, 2–40 versus median, 9 days; range, 1–61 days; P=0.033).

Conclusions—24/7 dysphagia screening can be effectively performed by nurses and leads to reduced pneumonia rates. Therefore, empowering nurses to do a formal bedside screening for swallowing dysfunction in stroke patients timely after admission is warranted whenever speech–language therapists are not available. (Stroke. 2017;48:00-00. DOI: 10.1161/STROKEAHA.117.018157.)

Key Words: deglutition disorders • nursing • pneumonia • stroke

Dysphagia occurs in up to two thirds of stroke patients and can lead to serious complications such as aspiration and pneumonia. Moreover, swallowing dysfunction has been associated with prolonged hospital stays, higher admittance rates to nursing homes, and increased healthcare costs.1

Screening for dysphagia before first oral intake of fluids or food after stroke can reduce aspiration/pneumonia and is recommended according to clinical guidelines regardless of initial stroke severity.1,2 However, in clinical practice, dysphagia screening is often performed mainly by speech–language therapists (SLT), who are not available outside regular working hours and especially not on weekends and holidays. This results in a delayed screening for dysphagia after stroke and might be associated with a higher risk of complications including pneumonia.1

Assessment of swallowing dysfunction by well-trained nurses is another option with the advantage of a 24-hour availability.2 We, therefore, trained all nurses of our department to perform the bedside Gugging Swallowing Screen (GUSS) in acute stroke patients admitted outside the working hours of SLT.3 To test the effectiveness of such an intervention, we compared the rate of pneumonia (primary outcome), time to dysphagia screening, and length of hospital stay (secondary outcomes) between a period when the first dysphagia assessment was done only by SLT and a period of 24/7 dysphagia screening including application of the GUSS by nurses.

Methods
The study was conducted at the Department of Neurology, Medical University Graz, Graz (Austria), which acts as a primary and tertiary care stroke center with a total of 98 beds and uses ≈100 nurses and 6 SLT.

Intervention
To extend the screening for dysphagia in stroke patients beyond working hours of SLT, we undertook a comprehensive training of all nurses of our department in the GUSS3 that is recommended for...
the assessment of swallowing dysfunction by the Austrian Stroke Society. It was shown that the GUSS, when conducted by nurses, has a sensitivity of 100%, a specificity of 69%, and a robust inter-rater reliability (k=0.835).4 The GUSS training (Figure) consisted of a theoretical and practical part and was supervised by an experienced SLT (K.D.) and an advanced practice nurse (C.P.).

**Design**

A pre- and post-intervention trial served to evaluate the effectiveness of a 24/7 screening for dysphagia. Patients admitted to our department with a diagnosis of ischemic stroke from January to May 2015 (before nurses’ training) were assigned to the control group. Ischemic stroke patients admitted to our department from January to May 2016 (after nurses’ training with 24/7 dysphagia screening) were assigned to the intervention group (Figure). Patients with a transient ischemic attack (ie, symptoms <24 hours without infarction on neuroimaging) or patients who received mechanical ventilation were excluded. The ethics committee of the Medical University of Graz approved the study.

**Data Definition**

All demographic, clinical, laboratory, and radiological data were retrieved from the medical records as they had been assessed and documented during the care for investigated patients. This routinely includes a review of the chest x-ray examinations by radiologists. Pneumonia was the main outcome measure and was defined according to the diagnostic criteria recommended for definite stroke-associated pneumonia1 with a positive chest x-ray examination as a prerequisite. Secondary outcomes were time to dysphagia screening and length of hospital stay. Severity of dysphagia was graded as follows: absent (20 GUSS points), mild (15–19 points), moderate (10–14 points), and severe (<9 points).3

**Statistical Evaluation**

We used IBM SPSS Statistics 23 for statistical analysis. The Kolmogorov–Smirnov test assessed normality of data distribution. Groups were compared by the χ² test (for nominal data), the Mann–Whitney U test (for non-normally distributed variables), or unpaired t test (for normally distributed continuous variables).

**Results**

In total, 384 patients with a mean age of 72.3±13.7 years and a median National Institutes of Health Stroke Scale score of 3 (range, 0–23) were included in the study. Overall, dysphagia was diagnosed in 144 patients (37.5%).

The intervention group consisted of 186 patients, and 198 patients served as controls. There were no differences regarding age, sex, and stroke severity between the 2 groups. Presence and severity of dysphagia according to the GUSS were also comparable between stroke patients in the intervention and control period (Table).

**Patient Outcomes**

The time to dysphagia screening was reduced to a median of 7 (range, 1–69) hours in the intervention group compared with 20 (range, 1–183) hours in the control group (P=0.001). Patients in the intervention group had a lower rate of pneumonia (3.8% versus 11.6%; P=0.004) and a reduced length of hospital stay (8, range, 2–40 versus 9, range, 1–61 days; P=0.033) compared with the control group. All pneumonias in both groups only occurred in patients with diagnosed swallowing dysfunction. In-hospital mortality was also lower in patients who received early screening by nurses (Table).

**Discussion**

In this clinical intervention study, we demonstrated that the training of nurses to perform a formal dysphagia screening in stroke patients and thus offering a 24/7 swallowing assessment lead to a lower rate of pneumonia and also reduced the length of hospitalization compared with standard dysphagia testing by SLT during routine working hours only. This supports the notion that a timely detection of dysphagia fosters prophylactic strategies against aspiration such as a nil-per-os status and nasogastric tube feeding and thereby can reduce the rate of pneumonia. This assumption is further strengthened by 2 recent studies showing that there is a dose–response relationship between the delay in dysphagia screening and an increased frequency of pneumonia in acute stroke patients.1,5 Contrary to our work, these studies and others were registry based and limited by (1) lacking systematic screening.
for swallowing dysfunction in a significant proportion of patients or (2) incomplete information on dysphagia screening methods/protocols.

Although dysphagia screening with different approaches including the GUSS is recommended in clinical guidelines, there is yet little evidence for the effectiveness of this intervention regarding outcome measures such as pneumonia. Also, data on implementing dysphagia screening protocols conducted by nurses has been lacking. In the absence of a general agreement on the best screening tool for nurses, we decided to use the GUSS because it is recommended by our national stroke society and has a high sensitivity for any swallowing dysfunction, which should increase the safety of nonspecialized screening. A potential limitation of the GUSS may be its relatively low specificity that can lead to unnecessarily preclude oral intake including important medications. However, as all patients with presumed dysphagia are subsequently seen by SLT, such misclassification will only last for a relatively short period and should not generate a major problem.

Interestingly, patients in the intervention group also had a shorter stay in the hospital and reduced short-term in-hospital mortality. Although these results were not expected, it can be speculated that a more rapid clarification of the swallowing status also speeds up the overall diagnostic work-up and leads to a faster normalization of the situation of especially those patients with confirmed normal swallowing. Notably, length of hospitalization can vary because of different reasons including severity of disability, other complications, or family/social support. Also, observed difference in mortality certainly needs to be interpreted with caution, and available data do not allow to clearly associate this finding with the reduced rate of pneumonia because we have no exact evidence for the cause of death on all patients.

There are several limitations of our work mainly attributable to the single-center, nonrandomized study design. However, a randomization procedure did not appear feasible for our study question, and we included every consecutive stroke patient within the respective study periods to minimize a potential selection bias. Also, no other significant changes in diagnosis or treatment occurred between the 2 study periods including habits of comedication. This is why we also abstained from a detailed comparison of both treatment groups including vascular risk factors, medications, neuroimaging findings, and comorbidity. However, both the control and interventional groups were comparable regarding major demographic and clinical variables. As we relied on pre-assessed data including interpretation of chest x-rays at the time of patient care, we should have avoided any investigator bias but may have underestimated the rate of pneumonia. However, the low rates of dysphagia and pneumonia in our patients with overall mild stroke severity compare well with other investigations. Finally, our results need to be confirmed in other centers and cohorts, and additional information from instrumental testing such as fiberendoscopic or videofluoroscopic evaluation of swallowing should be incorporated in future studies.

Disclosures

None.

References

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Stroke. published online July 17, 2017;
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2017 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/early/2017/07/17/STROKEAHA.117.018157