NCPD

2.0 ANCC Contact Hours

A Swallowing Screening Test Enhances a Better Recognition of Patients with a Hip Fracture at Risk for Oropharyngeal Dysphagia

Hugo Wijnen ▼ Peter P. Schmitz ▼ Martine Jansen ▼ Linda Hendrix ▼ Job L. C. van Susante ▼ Hanna Willems

Oropharyngeal dysphagia (OD) is commonly encountered in elderly patients with hip fracture. It is easily overlooked and predisposes patients to life-threatening postoperative pneumonia. The aim of this study was to evaluate whether OD screening by nurses results in a better recognition of patients at risk for OD. After the introduction of the Standardized Swallowing Assessment by nurses, the incidence of increased risk for OD and the prevention of OD complications were monitored (intervention group; $N = 92$) and compared with a historical control group ($N = 81$). The risk for OD was diagnosed in 27 patients (29%) in the intervention group in comparison with 12 patients (15%) in the control group ($p < .05$). The number of diet modifications increased from 12 (15%) in the control group to 25 (27%) in the intervention group ($p < .05$). A simple screening test results in better recognition of increased OD risk and, in turn, the early initiation of measures to avoid aspiration.

Introduction

The prevalence of swallowing disorders or oropharyngeal dysphagia (OD) increases with age (Kayser-Jones & Pengilly, 1999; Roy et al., 2007; Takizawa et al., 2016) and rises to 30% in patients admitted to acute geriatric wards and up to 50% in patients living in nursing homes (Kayser-Jones & Pengilly, 1999; Lee et al., 1999; Park et al., 2013). Stroke, Parkinson's disease, and Alzheimer's disease are the most common predisposing risk factors for developing OD (Cook & Kahrilas, 1999; Takizawa et al., 2016). The risk for OD increases even further with higher American Society of Anesthesiology (ASA) scores, as well as hospitalization and intubation (Meals et al., 2016; Skoretz et al., 2010; Wirth et al., 2016). Hip fractures usually occur in older patients with comorbidities such as stroke or dementia (Friedman et al., 2009, Prestmo et al., 2015). Moreover, patients hospitalized for a hip fracture, as they are typically intubated during surgery, have a particularly high prevalence of OD.

A number of studies have found a high prevalence of OD after hip fracture surgery, varying from 5.3% to up to 54% (Beric et al., 2019; Byun, Kwon, et al., 2019; Love et al., 2013; Meals et al., 2016). Remarkably, Love et al. (2013) found an OD prevalence in patients with hip fracture (mean age = 83 years; 70% women) of 7% before admission but a prevalence of 34% after surgery. These results might imply a temporary effect of the illness itself, the hospitalization, surgery, and intubation on swallowing function; this can be seen as a call for recognition of OD in these patients after surgery to prevent consequences such as pneumonia.

In the decades to come, the prevalence of hip fracture is expected to sharply increase due to improved healthcare and increased life expectancy (Baker et al., 2014). Especially in fragile older patients, hip fracture surgery requires a multidisciplinary approach,

Hugo Wijnen, MD, is Geriatrician, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Arnhem, the Netherlands.

Peter P. Schmitz, MD, is Doctor, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Arnhem, the Netherlands.

Martine Jansen, is Physician Assistant, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Arnhem, the Netherlands.

Linda Hendrix, is Speech-language pathologist, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Arnhem, the Netherlands.

Job L. C. van Susante, PhD, is Orthopaedic Surgeon, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Arnhem, the Netherlands.

Hanna Willems, PhD, is Geriatrician, Department of Internal Medicine and Geriatrics, Amsterdam University Medical Centre, Amsterdam, the Netherlands.

All authors declare that they have no conflict of interest.

Correspondence: Peter P. Schmitz, MD, Department of Orthopedics, Geriatrics and Speech-Language Pathology, Rijnstate Hospital Arnhem, Wagnerlaan 55, Arnhem, AD 6815, the Netherlands (PSchmitz@Rijnstate.nl).

DOI: 10.1097/NOR.0000000000000743

preferably in a preplanned care pathway to prevent complications and reduce mortality (Friedman et al., 2009; Prestmo et al., 2015). Pneumonia is a common complication after hip fracture surgery, with a postoperative prevalence ranging from 4% to 11% in large retrospective studies (Carpintero et al., 2014; Jang et al., 2020; Lawrence et al., 2002). Because OD is present in more than 50% of elderly patients with pneumonia, aspiration could be an important cause of pneumonia in the elderly (Cabre et al., 2010; Teramoto et al., 2008). Indeed, aspiration pneumonia was diagnosed in 9% of postoperative patients with hip fracture in a recent study (Byun, Shon, et al., 2019). In another retrospective study, Byun, Kwon, et al. (2019) identified OD as a risk factor for pneumonia, intensive care unit admission, and death within 6 months after surgery in 546 patients with hip fracture older than 65 years. Other studies have demonstrated that pneumonia is a common cause of death and results in a higher 30-day and 1-year mortality in patients with hip fracture (Jang et al., 2020; Khan et al., 2013).

In other patient groups with a high risk of OD, such as patients with stroke, early recognition of risk for OD and subsequent modification of food and drink consistency were essential in minimizing OD-related pneumonia (Newman et al., 2016; Titsworth et al., 2013). This might also be true for patients with hip fracture, although there is scarce evidence to support this hypothesis (Beck et al., 2018; O'Keeffe, 2018). There are several bedside screening tools available for OD screening but not one has been identified as superior (Donovan et al., 2013). Validated screening tools use different amounts of water or different viscosities of fluids to screen for OD, for example, the 3-oz water swallow test, the volume-viscosity swallowing test (V-VST), the Toronto bedside swallowing test (TOR-BSST), and the Standardized Swallowing Assessment (SSA) (Kertscher et al., 2014). Most tools are validated in patients with acute stroke or patients admitted to long-term care facilities (Donovan et al., 2013; Sitoh et al., 2000). In daily practice, the diagnosis of OD is based on the findings from a speech–language pathologist's clinical examination whereas video fluoroscopy and Flexible Endoscopic Evaluation of Swallowing are considered the golden standard for research purposes and complex cases (Rommel & Hamdy, 2016). Timely evaluation for OD after hip fracture surgery by a speech–language pathologist or video fluoroscopy is not often possible due to their limited availability in hospitals. A timely assessment of OD, however, is essential to prevent these patients from aspiration pneumonia and even death. The question is which diagnostic tool is easily available, is swiftly executed, and can be easily implemented in daily practice to improve recognition of OD in patients with hip fracture.

The aim of this study was to determine whether the introduction of OD screening by nurses improved recognition of patients at risk for OD as compared with a historical control group with usual care. In addition, we assumed that an improved recognition of OD risk would result in an increase in the number of diet modifications and referrals to a speech–language pathologist.

Methods

Sample/Setting

This retrospective cohort study was performed in Rijnstate Hospital, a regional teaching hospital in the east of the Netherlands, on an orthogeriatric ward. Postoperative patients with hip fracture on this ward between November 2014 and July 2015, aged 70 years and older, were included in the intervention group. The control group included postoperative patients with hip fracture surgery on the orthogeriatric ward between January and May 2013, 16 months before the introduction of the intervention. To prevent selection bias, inclusion was irrespective of previous medical comorbidities associated with OD. Exclusion criteria were postoperative stroke and death before OD screening. All participants or their proxies were approached by the nurse practitioner for written informed consent before the second postoperative day. Written informed consent was given by all the participants or their proxies. The study was approved by the local hospital ethics committee (LTC 1035/160714) and institutional review board.

The procedures followed were in accordance with the ethical standards of the institutional and/or research committee and with the 1964 Helsinki Declaration and its later amendments.

Instruments

Patients in the intervention group were screened for OD with the SSA, developed by Perry (2001a, 2001b). The SSA is a screening tool for nurses and is widely used in stroke units and neurological hospital wards. The SSA has a sensitivity of 0.97 (95% CI [0.93, 1.0]) and a specificity of 0.90 (95% CI [0.83, 0.97]) for detection of OD, with positive and negative predictive values of 0.92 and 0.96, respectively, in patients with acute stroke. The SSA also demonstrated good agreement with summative clinical judgment of swallow function ($\kappa = 0.88$) (Perry, 2001a, 2001b).

Nurses were provided with clinical instruction by a speech–language pathologist in how to perform the SSA on the orthogeriatric ward. The SSA starts by checking for contraindications to OD screening, that is, to look for symptoms of impaired consciousness. If the patient is suitable for OD evaluation, as illustrated in the algorithm in Figure 1, screening starts by observing for signs of impaired swallowing such as difficulty swallowing saliva, a rattling voice, shortness of breath, or a cough. If any of these signs are present, the patient is considered to be at an increased risk for severe OD, started on a modified diet, and referred to a speech–language pathologist to confirm the diagnosis. If clinical signs of OD are absent, the nurse administers three consecutive teaspoons of water; if the patient has no difficulty drinking the teaspoons of water, half a cup of water is provided to drink in one go. If at any stage of this screening the patient shows signs of OD, the test is aborted and the patient is considered to have an increased risk for OD. A speech–language pathologist is consulted to confirm OD in those considered at an increased risk; food and drink consistencies are also modified. If no signs of OD are

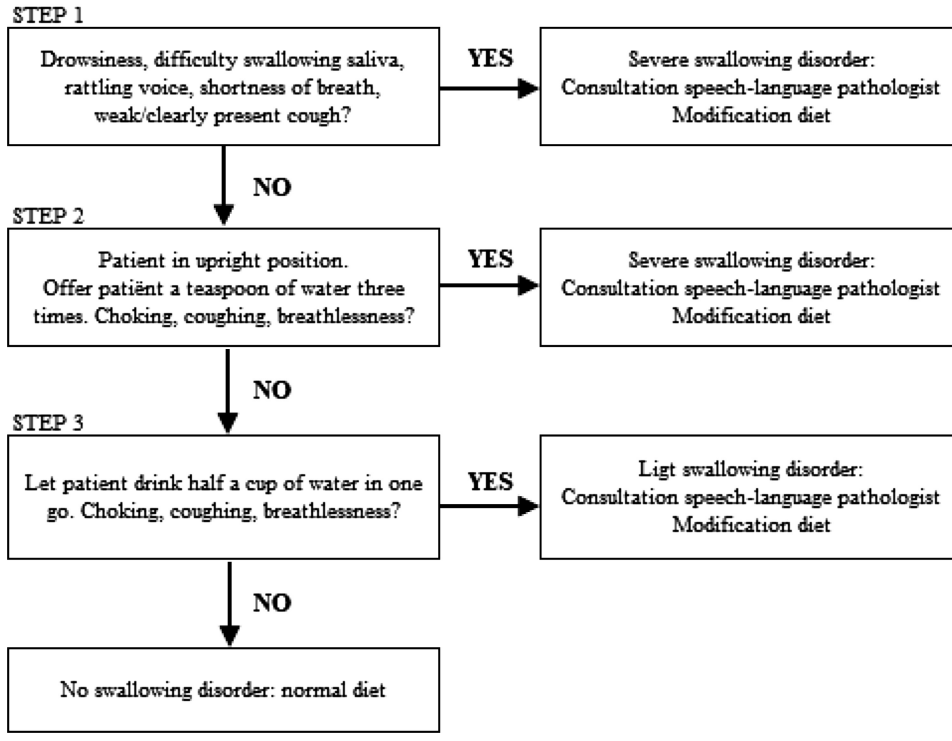

FIGURE 1. Standard Swallowing Assessment protocol for oropharyngeal dysphagia.

present, swallowing function is considered normal and normal diet is administered.

In the control group, increased risk for OD was retrospectively defined as follows: clinical suspicion of OD in the medical chart, diet modification to prevent OD complications, or request for speech–language pathologist consultation. A clinical suspicion of OD was defined as difficult or delayed swallowing, frequent coughing or dyspnea after swallowing, rattling voice, food leaking out when swallowing, and food residue in the mouth after swallowing. Patients in the control group were considered to have an OD diagnosis if it was confirmed by a speech–language pathologist's clinical examination within 5 days after surgery. The 5-day limit was chosen because in this period OD was more likely to be related to surgery and less likely related to other causes. To prevent selection bias, patients with a diagnosis of OD before surgery were also included in the study.

Data Collection

In this cohort study, patient characteristics at baseline—including age, gender, living environment, use of a walking aid, prior swallowing difficulties, consultation of a speech–language pathologist, diet modification, medical history of cerebrovascular events, Parkinson's disease, or dementia—were extracted from the medical records. Furthermore, the Charlson comorbidity index was assessed. The Charlson comorbidity index predicts the 1-year mortality for a patient based on comorbidities such as heart disease, AIDS, or cancer (a total of 22 conditions). Each comorbidity is scored as 1, 2, 3, or 6, depending on the mortality risk. The relative risk of death for each increasing point in the Charlson comorbidity index is 1.46 (99% CI [1.22, l.74], $p < .0001$) (Charlson et al., 1994). Control group data were retrospectively collected from the medical chart and noted in the database program, Research Manager, by a nurse practitioner. Intervention group data were prospectively registered in Research Manager during the patient's hospital stay by a nurse practitioner.

Data Analysis

Continuous variables are presented as mean ± standard deviation (*SD*). Dichotomous variables are presented as frequencies and percentages. Means from continuous variables were compared using Student's *t* test for independent samples. To compare dichotomous variables, the Chi-square test was conducted. Fisher's exact test was used when more than 20% of cells had an expected frequency of less than 5. Univariate and multivariate logistic regression analyses were performed to assess the main factors associated with OD; $p < .05$ (two-sided) was considered statistically significant. Statistical analysis was performed using IBM SPSS Statistics (Version 21).

Results

Intervention Group

In the intervention group, 98 patients with hip fracture provided signed informed consent for OD screening during the study period. During admission, four patients were excluded because of death, one due to an incomplete OD screening, and one due to double registration. Finally, 92 patients were included in this study (see Figure 2). At the time of surgery, the mean age was 83 years and 22% were men. A third of the patients

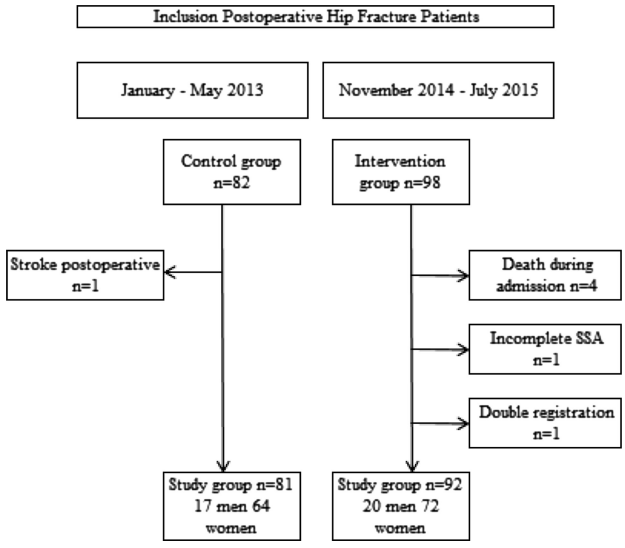

Figure 2. Flow chart. SSA = Standard Swallowing Assessment.

resided in long-term care facilities or had symptoms of dementia (see Table 1). In the intervention group, three patients had diet modifications prior to admission due to self-reported swallowing difficulties.

Control Group

In the control group, 82 patients were identified; one was excluded because of postoperative stroke, leaving 81 patients who were included in the control cohort. At baseline, patient characteristics in the control and intervention groups did not differ, except for the use of a walking aid—58% in the control group and 35.2% in the intervention group ($p = .003$; see Table 1). In the control group, no diet modifications were documented prior to admission.

Risk of OD and Measures to Prevention OD Complications

Routine screening for OD significantly increased recognition of patients at risk for OD from 15% ($n = 12/81$) in the control group to 29% in the intervention group ($n = 27/92$) ($p < .05$). Referrals to a speech–language pathologist and confirmation of the OD diagnosis increased nonsignificantly from 11% ($n = 9/81$) in the control group to 21% ($n = 19/92$) in the intervention group ($p = .09$; see Table 2). After introduction of OD screening, the number of diet modifications increased significantly from 15% ($n = 12/81$) in the control group to 27% ($n = 25/92$) in the intervention group ($p < .05$). Of the 25 patients with a diet modification in the intervention group, 18 (19.6%) had thickened fluids (with a viscosity similar to honey) and soft foods, six (6.5%) had pudding-like fluids and pureed foods, and one (1.1%) received nil by mouth. In the control group, one patient (1.2%) received nil per mouth and 11 patients (13.6%) received thickened fluids and soft foods.

Univariate logistic regression analyses found associations between a positive screening for OD and older age ($p < .01$; OR = 1.08; 95% CI [1.02, 1.15]), positive screening for OD and dementia ($p < .01$; OR = 3.30; 95% CI [1.56, 6.96]), positive screening for OD and postoperative delirium ($p \leq .001$; OR = 3.76; 95% CI [1.79, 7.91]), higher Charlson comorbidity index ($p < .05$; OR = 2.13; 95% CI [1.03, 4.40]), and for living in a residential aging care facility before admission ($p < .01$; OR = 2.8; 95% CI [1.34, 5.85]) (see Table 3). Of the patients who lived in a psychogeriatric nursing home, 67% had

Table 1. Patient Characteristics at Baseline

Population Variable	Control Group ($n = 81$), %	Intervention Group ($n = 92$), %	p[a]
Gender, *n* (female %)	64 (79.0)	72 (78.3)	.904
Age, mean ±*SD*, years	83.1 ± 6.9	83.5 ±7.4	.738
Charlson comorbidity index score, *n* (%)			.987
≤5	45 (55.6)	51 (55.4)	
>5	36 (44.4)	41 (44.6)	
Living status, *n* (%)			.292
Home	53 (65.4)	67 (72.8)	
RACF	28 (34.6)	25 (27.2)	
Comorbidity, *n* (%)			
Parkinson's disease	4 (4.9)	1 (1.1)	.187
CVA	4 (4.9)	12 (13)	.066
Dementia	25 (30.9)	24 (26.1)	.487
Use of walking aid	47 (58.0)	32 (35.2)	**.003***
Delirium postsurgery	36 (44.4)	28 (30.4)	.057
Prior swallowing difficulties	0 (0)	3 (3.3)	.249

Note. CVA = cerebrovascular accident; RACF = residential age care facility.
[a]Student's *t* test, χ^2 test, or Fisher's exact test, as appropriate.
*$p < .05$.

Table 2. Oropharyngeal Dysphagia Screening and Preventive Measures

Variable	Control Group (n = 81), n (%)	Intervention Group (n = 92), n (%)	p[a]
Patient screened positive for increased OD risk	12 (14.8)	27 (29.3)	.022*
Patient put on diet modification	12 (14.8)	25 (27.2)	.048*
Confirmed OD diagnosis	9 (11.1)	19 (20.7)	.089
Referral to a speech–language pathologist	9 (11.1)	19 (20.7)	.089

Note. OD = oropharyngeal dysphagia.
[a]χ^2 test or Fisher's exact test, as appropriate.
*$p < .05$.

an increased risk for OD and needed diet modifications in comparison with 20% of the patients who lived independently before admission.

Multivariate logistic regression analyses demonstrated that independent risk factors for OD were delirium, raising the odds for a positive screening by 2.52 (95% CI [1.04, 6.10]), and age, raising the odds for a positive screening every year by 1.08 (95% CI [1.01, 1.15]) (see Table 3).

Discussion

In this study, screening for OD by nurses increased the recognition of OD risk from 15% in a historical control group to 29% in the intervention group. There was also a significant increase in diet modifications from 15% in the historical control group to 27% after screening for OD. Referrals to a speech–language pathologist increased nonsignificantly from 11% in the control group to 21% in the intervention group. All diagnoses of referrals to the speech–language pathologist for increased risk of OD were confirmed by the speech–language pathologist. Hence, introduction of OD screening resulted in a significant increase in the recognition of patients at risk for OD, was responsible for significantly more diet modifications, and trended toward more referrals to a speech–language pathologist. These data underline the benefits of implementation of an OD screening in daily practice: OD screening triggers early and swift diet modification, which is the cornerstone of preventing OD complications.

This study confirms the high prevalence of swallowing disorders after hip fracture surgery in frail elderly patients as found in previous studies (Beric et al., 2019; Love et al., 2013; Meals et al., 2016). Love et al. (2013) showed in a prospective cohort study of 181 postoperative patients with hip fracture (mean age = 83 years; 70% women) an OD prevalence of 34%. This OD prevalence was assessed by clinical swallowing examination performed by speech–language pathologists within 72 hours after surgery (Love et al., 2013). The prevalence of increased risk for OD in this study (29%) by a simple screening tool corresponds with the prevalence of 34% encountered in the study by Love et al. (2013). The patient characteristics in this study are representative of a hip fracture population with an average age above 80 years, predominantly female, and a third of the population resided in long-term care facilities or demonstrated symptoms of dementia (Nijmeijer et al., 2016). The importance and benefit of screening for OD in patients with neurological diseases have repeatedly been shown irrespective of the method used to recognize OD (Hinchey et al., 2005; Titsworth et al., 2013). Current consensus is that screening for OD in patients with stroke is effective in reducing pneumonia regardless of the type of screening tool used (Donovan et al.,

Table 3. Risk Factors for Oropharyngeal Dysphagia

	Univariate Analysis				Multivariate Analysis			
			95% CI				95% CI	
Risk Factors for OD	OR	p[a]	Lower	Upper	OR	p[a]	Lower	Upper
Dementia	3.3	.002	1.6	7.0	1.7	.28	0.6	4.7
Living in RACF	2.8	.006	1.3	5.8	1.4	.48	0.6	3.3
Delirium	3.8	<.001	1.8	7.9	2.5	.04	1.04	6.10
Age, years	1.1	.005	1.02	1.15	1.1	.02	1.01	1.15
Charlson comorbidity index score >5	2.1	.04	1.03	4.40	1.4	.44	0.6	3.1
Gender	1.1	.88	0.4	2.6	NA	NA	NA	NA
Stroke	2.3	.14	0.8	6.7	NA	NA	NA	NA
Parkinson's disease	2.4	.36	0.4	14.7	NA	NA	NA	NA
Using walking aid	1.9	.10	0.9	3.9	NA	NA	NA	NA

Note. NA = not assessed; OD = oropharyngeal dysphagia; OR = odds ratio; RACF = residential age care facility.
[a]Wald's test for univariate and multivariate regression analyses.

2013). The current study demonstrates that OD screening with the SSA can be reliably administered by orthogeriatric nurses and improves timely recognition of patients with an increased OD risk. In this way, the SSA enables orthogeriatric nurses to intervene in patients with an increased OD risk by diet modification and referral to a speech–language pathologist, which probably decreases the likelihood of chocking and aspiration in frail elderly postoperative patients with hip fracture surgery.

In the future, implementation of the SSA as an OD screening test in an orthogeriatric ward seems realistic. The SSA by nurses is much simpler to perform in daily practice than a clinical examination by a speech–language pathologist. As the test can be performed by nurses, there is a reduction in diagnostic delay. Furthermore, if the condition of the patient changes, the SSA can be repeated immediately. Finally, the SSA takes less than 5 minutes to conduct and is less intensive than a speech–language pathologist examination. As in our study, the only requirement for implementation of the SSA is a single clinical instruction for nurses by a speech–language pathologist. Preferably, the SSA is a tool integrated in the electronic patient file. Finally, implementation of the SSA is ideally accompanied by an expansion of the availability of speech–language pathologists.

The clinical impact of OD in frail elderly, such as patients with hip fracture, includes an increased risk of pneumonia, malnutrition, and death. Its potential treatability and reversibility combined with a high prevalence all underscore the importance of further evaluating interventions to screen for OD and prevent OD-related aspiration and its clinical consequences in frail elderly patients admitted to the hospital, especially after surgery. Although we found that postoperative delirium is an independent risk factor for an increased OD risk, we propose a standard swallowing screening for all patients with hip fracture because an increased OD risk is also present in other patient groups. The use of the SSA by nurses will likely identify more patients who screen positive and, in turn, increase the need for diet modifications and probably referrals to speech–language pathologists. This will decrease the likelihood of OD in all patients with hip fracture. Thus, OD screening can add awareness of postoperative OD on surgical wards and therefore enhance improvement in quality of care especially for frail elderly patients.

This study has several limitations. The design of this study with a retrospective control group limited our ability to compare the two study cohorts, which at baseline only differed in the use of walking aids. Furthermore, different methods were used to assess risk of OD. In the intervention group, OD risk was assessed with the SSA whereas in the control group, OD risk was considered present if a clinical suspicion of OD, a diet modification, or a speech–language pathologist consultation was recorded in the patient's chart.

Another limitation is that patients with normal swallowing (according to a negative OD screening) were not evaluated by a speech–language pathologist. However, a negative SSA in patients with stroke has been found to be accurate (Perry, 2001a, 2001b) and the authors could not see a reason why it would not be accurate in patients with hip fracture, although the screening tool is formally not validated in this patient group.

Therefore, the reported findings should be interpreted with caution. Nevertheless, the comparison between the intervention group and the control group is justified (and with that the conclusion of an improved recognition of increased OD risk) because both patient groups had similar patient characteristics and were treated in the same trauma ward.

Finally, the SSA is not yet validated in a postoperative hip surgery population (Perry, 2001a, 2001b). However, because the tool is simple and clear, there is no reason to presume this validation does not apply to patients with hip fracture. However, the SSA was evaluated and validated to screen for OD in various patient groups, including nursing home patients, a population similar to patients with hip fracture (Jiang et al., 2016; Park et al., 2015).

In conclusion, introduction of the SSA after hip fracture surgery resulted in better recognition of an increased risk for OD and induced more diet modifications. The SSA can be easily implemented and can be swiftly executed by trained nurses. Screening for OD may minimize the risk of aspiration and OD-related pneumonia in these frail patients. Therefore, screening for OD might be important in the postoperative care of patients with hip fracture. However, further research is needed to prove that screening for OD eventually results in less pneumonia before standardly integrating OD screening in the postoperative treatment of patients with hip fracture.

References

Baker, P. N., Salar, O., Ollivere, B. J., Forward, D. P., Weerasuriya, N., Moppett, I. K., & Moran, C. G. (2014). Evolution of the hip fracture population: Time to consider the future? A retrospective observational analysis. *BMJ Open*, *4*(4), e004405. https://doi.org/10.1136/bmjopen-2013-004405

Beck, A. M., Kjaersgaard, A., Hansen, T., & Poulsen, I. (2018). Systematic review and evidence based recommendations on texture modified foods and thickened liquids for adults (above 17 years) with oropharyngeal dysphagia—An updated clinical guideline. *Clinical Nutrition*, *37*(6, Pt A), 1980–1991. https://doi.org/10.1016/j.clnu.2017.09.002

Beric, E., Smith, R., Phillips, K., Patterson, C., & Pain, T. (2019). Swallowing disorders in an older fractured hip population. *Australian Journal of Rural Health*, *27*(4), 304–310. https://doi.org/10.1111/ajr.12512

Byun, S. E., Kwon, K. B., Kim, S. H., & Lim, S. J. (2019). The prevalence, risk factors and prognostic implications of dysphagia in elderly patients undergoing hip fracture surgery in Korea. *BMC Geriatrics*, *19*(1), 356. https://doi.org/10.1186/s12877-019-1382-x

Byun, S. E., Shon, H. C., Kim, J. W., Kim, H. K., & Sim, Y. (2019). Risk factors and prognostic implications of aspiration pneumonia in older hip fracture patients: A multicenter retrospective analysis. *Geriatrics & Gerontology International*, *19*(2), 119–123. https://doi.org/10.1111/ggi.13559

Cabre, M., Serra-Prat, M., Palomera, E., Almirall, J., Pallares, R., & Clavé, P. (2010). Prevalence and prognostic implications of dysphagia in elderly patients

with pneumonia. *Age and Ageing*, *39*(1), 39–45. https://doi.org/10.1093/ageing/afp100
Carpintero, P., Caeiro, J. R., Carpintero, R., Morales, A., Silva, S., & Mesa, M. (2014). Complications of hip fractures: A review. *World Journal of Orthopedics*, *5*(4), 402–411. https://doi.org/10.5312/wjo.v5.i4.402
Charlson, M., Szatrowski, T. P., Peterson, J., & Gold, J. (1994). Validation of a combined comorbidity index. *Journal of Clinical Epidemiology*, *47*(11), 1245–1251. https://doi.org/10.1016/0895-4356(94)90129-5
Cook, I. J., & Kahrilas, P. J. (1999). AGA technical review on management of oropharyngeal dysphagia. *Gastroenterology*, *116*(2), 455–478. https://doi.org/10.1016/s0016-5085(99)70144-7
Donovan, N. J., Daniels, S. K., Edmiaston, J., Weinhardt, J., Summers, D., & Mitchell, P. H. (2013). Dysphagia screening: State of the art: Invitational conference proceeding from the State-of-the-Art Nursing Symposium, International Stroke Conference 2012. *Stroke*, *44*(4), e24–e31.https://doi.org/10.1161/STR.0b013e3182877f57
Friedman, S. M., Mendelson, D. A., Bingham, K. W., & Kates, S. L. (2009). Impact of a comanaged Geriatric Fracture Center on short-term hip fracture outcomes. *Archives of Internal Medicine*, *169*(18), 1712–1717. https://doi.org/10.1001/archinternmed.2009.321
Hinchey, J. A., Shephard, T., Furie, K., Smith, D., Wang, D., & Tonn, S. (2005). Formal dysphagia screening protocols prevent pneumonia. *Stroke*, *36*(9), 1972–1976. https://doi.org/10.1161/01.STR.0000177529.86868.8d
Jang, S. Y., Cha, Y., Yoo, J. I., Yu, Y. T., Kim, J. T., Park, C. H., & Choy, W. (2020). Effect of pneumonia on all-cause mortality after elderly hip fracture: A Korean nationwide cohort study. *Journal of Korean Medical Science*, *35*(2), e9. https://doi.org/10.3346/jkms.2020.35.e9
Jiang, J. L., Fu, S. Y., Wang, W. H., & Ma, Y. C. (2016). Validity and reliability of swallowing screening tools used by nurses for dysphagia: A systematic review. *Ci Ji Yi Xue Za Zhi*, *28*(2), 41–48. https://doi.org/10.1016/j.tcmj.2016.04.006
Kayser-Jones, J., & Pengilly, K. (1999). Dysphagia among nursing home residents. *Geriatric Nursing*, *20*(2), 77–82; quiz 84. https://doi.org/10.1053/gn.1999.v20.97011
Kertscher, B., Speyer, R., Palmieri, M., & Plant, C. (2014). Bedside screening to detect oropharyngeal dysphagia in patients with neurological disorders: An updated systematic review. *Dysphagia*, *29*(2), 204–212. https://doi.org/10.1007/s00455-013-9490-9
Khan, M. A., Hossain, F. S., Ahmed, I., Muthukumar, N., & Mohsen, A. (2013). Predictors of early mortality after hip fracture surgery. *International Orthopaedics*, *37*(11), 2119–2124. https://doi.org/10.1007/s00264-013-2068-1
Lawrence, V. A., Hilsenbeck, S. G., Noveck, H., Poses, R. M., & Carson, J. L. (2002). Medical complications and outcomes after hip fracture repair. *Archives of Internal Medicine*, *162*(18), 2053–2057. https://doi.org/10.1001/archinte.162.18.2053
Lee, A., Sitoh, Y. Y., Lieu, P. K., Phua, S. Y., & Chin, J. J. (1999). Swallowing impairment and feeding dependency in the hospitalised elderly. *Annals of the Academy of Medicine, Singapore*, *28*(3), 371–376.
Love, A. L., Cornwell, P. L., & Whitehouse, S. L. (2013). Oropharyngeal dysphagia in an elderly post-operative hip fracture population: A prospective cohort study. *Age and Ageing*, *42*(6), 782–785. https://doi.org/10.1093/ageing/aft037
Meals, C., Roy, S., Medvedev, G., Wallace, M., Neviaser, R. J., & O'Brien, J. (2016). Identifying the risk of swallowing-related pulmonary complications in older patients with hip fracture. *Orthopedics*, *39*(1), e93–e97. https://doi.org/10.3928/01477447-20151222-07
Newman, R., Vilardell, N., Clavé, P., & Speyer, R. (2016). Effect of bolus viscosity on the safety and efficacy of swallowing and the kinematics of the swallow response in patients with oropharyngeal dysphagia: White paper by the European Society for Swallowing Disorders (ESSD). *Dysphagia*, *31*(2), 232–249. https://doi.org/10.1007/s00455-016-9696-8
Nijmeijer, W. S., Folbert, E. C., Vermeer, M., Slaets, J. P., & Hegeman, J. H. (2016). Prediction of early mortality following hip fracture surgery in frail elderly: The Almelo Hip Fracture Score (AHFS). *Injury*, *47*(10), 2138–2143. https://doi.org/10.1016/j.injury.2016.07.022
O'Keeffe, S. T. (2018). Use of modified diets to prevent aspiration in oropharyngeal dysphagia: Is current practice justified?*BMC Geriatrics*, *18*(1), 167. https://doi.org/10.1186/s12877-018-0839-7
Park, Y. H., Bang, H. L., Han, H. R., & Chang, H. K. (2015). Dysphagia screening measures for use in nursing homes: A systematic review. *Journal of Korean Academy of Nursing*, *45*(1), 1–13. https://doi.org/10.4040/jkan.2015.45.1.1
Park, Y. H., Han, H. R., Oh, B. M., Lee, J., Park, J. A., Yu, S. J., & Chang, H. (2013). Prevalence and associated factors of dysphagia in nursing home residents. *Geriatric Nursing*, *34*(3), 212–217. https://doi.org/10.1016/j.gerinurse.2013.02.014
Perry, L. (2001a). Screening swallowing function of patients with acute stroke. Part one: Identification, implementation and initial evaluation of a screening tool for use by nurses. *Journal of Clinical Nursing*, *10*(4), 463–473. https://doi.org/10.1046/j.1365-2702.2001.00501.x
Perry, L. (2001b). Screening swallowing function of patients with acute stroke. Part two: Detailed evaluation of the tool used by nurses. *Journal of Clinical Nursing*, *10*(4), 474–481. https://doi.org/10.1046/j.1365-2702.2001.00502.x
Prestmo, A., Hagen, G., Sletvold, O., Helbostad, J. L., Thingstad, P., Taraldsen, K., Lydersen, S., Halsteinli, V., Saltnes, T., Lamb, S. E., Johnsen, L. G., & Saltvedt, I. (2015). Comprehensive geriatric care for patients with hip fractures: A prospective, randomised, controlled trial. *The Lancet*, *385*(9978), 1623–1633. https://doi.org/10.1016/s0140-6736(14)62409-0
Rommel, N., & Hamdy, S. (2016). Oropharyngeal dysphagia: Manifestations and diagnosis. *Nature Reviews Gastroenterology & Hepatology*, *13*(1), 49–59. https://doi.org/10.1038/nrgastro.2015.199
Roy, N., Stemple, J., Merrill, R. M., & Thomas, L. (2007). Dysphagia in the elderly: Preliminary evidence of prevalence, risk factors, and socioemotional effects. *Annals of Otology, Rhinology and Laryngology*, *116*(11), 858–865. https://doi.org/10.1177/000348940711601112
Sitoh, Y. Y., Lee, A., Phua, S. Y., Lieu, P. K., & Chan, S. P. (2000). Bedside assessment of swallowing: A useful screening tool for dysphagia in an acute geriatric ward. *Singapore Medical Journal*, *41*(8), 376–381.
Skoretz, S. A., Flowers, H. L., & Martino, R. (2010). The incidence of dysphagia following endotracheal intubation: A systematic review. *Chest*, *137*(3), 665–673. https://doi.org/10.1378/chest.09-1823
Takizawa, C., Gemmell, E., Kenworthy, J., & Speyer, R. (2016). A systematic review of the prevalence of oropharyngeal dysphagia in stroke, Parkinson's disease, Alzheimer's disease, head injury, and pneumonia.

Dysphagia, *31*(3), 434–441. https://doi.org/10.1007/s00455-016-9695-9

Teramoto, S., Fukuchi, Y., Sasaki, H., Sato, K., Sekizawa, K., & Matsuse, T. (2008). High incidence of aspiration pneumonia in community- and hospital-acquired pneumonia in hospitalized patients: A multicenter, prospective study in Japan. *Journal of the American Geriatrics Society*, *56*(3), 577–579. https://doi.org/10.1111/j.1532-5415.2008.01597.x

Titsworth, W. L., Abram, J., Fullerton, A., Hester, J., Guin, P., Waters, M. F., & Mocco, J. (2013). Prospective quality initiative to maximize dysphagia screening reduces hospital-acquired pneumonia prevalence in patients with stroke. *Stroke*, *44*(11), 3154–3160. https://doi.org/10.1161/strokeaha.111.000204

Wirth, R., Dziewas, R., Beck, A. M., Clave, P., Hamdy, S., Heppner, H. J., Langmore, S., Leischker, A. H., Martino, R., Pluschinski, P., Rösler, A., Shaker, R., Warnecke, T., Sieber, C. C., & Volkert, D. (2016). Oropharyngeal dysphagia in older persons—from pathophysiology to adequate intervention: A review and summary of an international expert meeting. *Clinical Interventions in Aging*, *11*, 189–208. https://doi.org/10.2147/cia.S97481

For additional nursing continuing professional development activities on orthopaedic nursing topics, go to nursingcenter.com/ce.