A VISION FOR DYSPHAGIA SCREENING BY NURSES

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Abstract

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Aim: The aim was to develop and implement in practice a simple nursing dysphagia screening tool (NDST).

Methods and Sample: In Phase 1, a total of 157 patients prone to dysphagia underwent a nursing swallowing assessment (32 items). The results were compared with the objective flexible endoscopic examination of swallowing (FEES). Nursing assessment items with a statistically significant relationship to FEES became the NDST items. In Phase 2, the effectiveness of an educational session on the NDST's correct use was studied, using a knowledge post-test. Seventy nurses or university students attended the session. In Phase 3, the NDST's inter-rater reliability was studied on a sample of 42 patients with cerebrovascular accident, using coefficient kappa (κ).

Results: Eight items were selected for the NDST; its sensitivity (95.5%) and negative predictive value (88.9%) were high in the neurological subgroup. The average success rate of the knowledge post-test was 73.8%. The overall inter-rater reliability was low ($\kappa = 0.264$; $p = 0.047$); however, substantial agreement was reached for selected items.

Conclusion: The NDST is the only dysphagia screening tool developed in the Czech Republic; its diagnostic criteria are high. Current work focuses on fine-tuning education and supporting its implementation.

Keywords: dysphagia, inter-rater reliability, nursing assessment, screening tool, swallowing

INTRODUCTION

Until about 5 years ago, the issue of nursing involvement in dysphagia (impaired swallowing) assessment received little attention in the Czech Republic (CR). This could be surprising as dysphagia is such a common problem, mainly in selected ear, nose, and throat (ENT) and neurological conditions (Bours et al., 2009, p. 478). In addition, dysphagia can be accompanied by a variety of complications, some of which can be quite serious – mainly aspiration, as it can lead to pneumonia and even death of the patient (Mandysova et al., 2012, p. 45).

Since then, however, the situation has changed substantially, and a number of steps have been taken by nurses and other health care workers to raise the awareness of this issue in the CR. These efforts reflect, at least to some extent, the results of various research studies conducted in the CR. For example, Petržílková et al. (2012, p. 263) studied the prevalence of subjectively perceived swallowing difficulties in 124 Czech seniors from health and social care institutions in the Liberec Region, using the ten-item Eating Assessment Tool (EAT-10). It was found that 25% of the seniors were "positive", i.e. they perceived swallowing-related problems in at least three of the ten items (Petržílková et al. (2012, p. 264). Other authors studying this issue in the CR have stressed the importance of a multidisciplinary approach to dysphagia assessment – nurses are an important member of such dysphagia teams as they can be involved in dysphagia screening (Tedla et al., 2009, p. 218; Mandysová, Ehler, 2011, p. 426). This approach is used in many countries (e.g. Canada, the United States, and Great Britain), mainly in the treatment and care of patients with acute cerebrovascular accident – ideally, dysphagia screening is conducted as early upon admission as possible to help reduce the incidence of dysphagia-related complications (Mandysová, Ehler, 2011, p. 426). In fact, it has been shown that the implementation of dysphagia screening programs by health care institutions is associated with a reduced incidence of pneumonia (Hinchey et al., 2005).

In the last 20 years, many dysphagia screening tools have been developed; typically, the process of dysphagia screening tool development consists in the identification of physical assessment items that are associated with dysphagia (specifically, with aspiration due to its potentially serious outcome, mentioned above), as detected by objective testing (Mandysová, Ehler, 2011, p. 427). However, many of the research studies contain methodological shortcomings (Bours et al., 2009). A common problem is that the objective test used to detect dysphagia (the "gold standard") is not "objective" enough or is not used at all; the ideal "gold standard" should be, according to many experts' opinion, flexible endoscopic examination of swallowing (FEES) or videofluoroscopy (Mandysová, Ehler, 2011, p. 427).

The issue in the CR is complicated by the fact that any dysphagia screening tool developed in a language other than Czech needs to be translated, which can be a very daunting task in itself. In 2009, Tedla et al. published, in Czech, a foreign-developed dysphagia screening tool; however, the authors did not provide any information on the process of the tool's translation. In addition, the tool had been adapted without proper testing through research, and its diagnostic criteria had not been studied. Therefore, it cannot be recommended for practice without further studies.

In 2012, a nursing dysphagia screening tool was published, in Czech, based on a research study conducted in the CR (Mandysová et al., 2012). It contained 8 items, and its diagnostic criteria (sensitivity, specificity, negative predictive value,

and positive predictive value) ranged from low to high, depending on whether the patients had a neurological or ENT diagnosis (Mandysová et al., 2012). Although the authors did not describe the method of individual item testing, further work has been underway, focusing on correct implementation of the tool in practice (Mandysová, Ehler, 2013). These efforts are linked to a single research study conducted in the period from 01/2009 to 12/2013; it consisted of three separate phases (Phase 1, Phase 2, and Phase 3). The aim of this paper to summarize these three phases, present the most important findings, and to propose the direction of further work in the area of nursing dysphagia assessment.

AIM

The overall aim of the study was to develop and implement in practice a simple nursing dysphagia screening tool (NDST). In Phase 1, the aim was to develop a simple nursing dysphagia screening tool (NDST). In Phase 2, the aim was to study the effectiveness of an educational session on the correct use of the tool. In Phase 3, the aim was to implement the NDST in practice and to study its inter-rater reliability.

SAMPLE

In Phase 1 (it spanned from 01/2009 to 07/2011), a total of 157 patients treated in a regional hospital (both inpatients and outpatients) were recruited. The patients had a neurological (n = 112) or ENT (n = 45) diagnosis and, based on their primary diagnosis, were at risk of dysphagia. In Phase 2, a total of 70 learners (30 general nurses from selected health care institutions and 40 university students enrolled in non-medical health care study programs) were recruited. In Phase 3, a total of 42 patients with cerebrovascular accident, hospitalized in a neurology clinic of a regional hospital, were enrolled.

METHODS

The centrepiece of Phase 1 entailed the development of a nursing screening tool for dysphagia. It was based on a so called "nursing assessment", which comprised the patients' physical assessment related to their swallowing function (a total of 32 items), including a swallow test using a thickened and thin liquid. The patients' individual item results were compared with a "gold standard", i.e. an objective examination of the swallowing function focusing on detecting penetration / aspiration – FEES, conducted by the physician.

Since all the results were dichotomized (normal versus abnormal), the patterns of association could be examined using the association coefficient phi (ϕ). Nursing assessment items with a statistically significant relationship to FEES were included in the NDST, as long as the items contained ≤ 5% of missing data. An important prerequisite for the development of a "generic" nursing tool was sufficient similarity between the two groups of patients (patients with a neurological condition on the one hand and patients with an ENT condition on the other hand). In other words, the frequency of abnormal findings associated with swallowing function needed to be similar for both groups of patients.

Next, the NDST's diagnostic criteria were calculated for each possible cut-off score; the priority was the highest possible sensitivity and negative predictive value (NPV).

Phase 2 (from 10/2011–11/2012) focused on studying the effectiveness of education on the correct use of the NDST, developed in Phase 1. The learners attended an educational session consisting of a video on patient assessment using the NDST, practising all the related skills, and a discussion. In total, 5 identical sessions were organized (three for the students and two for the nurses), and the size of each group ranged from 9 to 18 learners.

Immediately after the session, the learners completed a knowledge post-test that measured their knowledge (it included 8 questions and so the total possible score was 8 points – one point for each correct answer). The knowledge post-test was a multiple-response test, and for each question, the probability to randomly choose the correct answer was 25%.

The learners' median, mode, average total score, and average success rate, obtained on the post-test, were calculated. In addition, each test question was analysed and its success rate was determined. Finally, attention was paid to the nature of the discussion and skill practice during each session. This aspect of the session was to a large extent determined by the learners themselves, and subsequently, its content could vary accordingly.

The centrepiece of Phase 3 (from 08/2013–12/2013) entailed determining inter-rater reliability of the NDST (through independent assessments by two assessors), in a research sample consisting of patients with cerebrovascular accident. The assessments were conducted ≤ 2 hours apart, and each assessor was blinded to the result obtained by the other assessor. The inter-rater reliability was determined for the overall result as well as for the individual assessment items, using coefficient kappa (κ).

RESULTS

As far as Phase 1 is concerned, it was found that between the two mentioned groups of patients, there were significant differences in the frequency of abnormal findings associated with swallowing function. Most importantly, "only" 41.5% of patients with a neurological condition had abnormal FEES; the percentage of patients with an ENT condition and abnormal FEES was much higher (60.5%). Therefore, the condition of "sufficient unanimity" for the development of a generic dysphagia screening tool was not met. Consequently, a neurological screening tool was developed, by analysing the results for the subset of 106 patients with a neurological diagnosis.

Out of 11 nursing assessment items with a statistically significant relationship to FEES, eight did not have missing data in more than 5% of the cases and were hence included in the screening tool (tab. 1).

Tab. 1. Nursing dysphagia screening tool

Items	Yes*	No
1. Ability to cough		
2. Ability to clench the teeth		
3. Symmetry / strength of the tongue		
4. Symmetry / strength of facial muscles		
5. Shoulder symmetry / strength		
6. Dysarthria		
7. Aphasia		
8. Thickened liquid: cough		

* "Yes" is abnormal for items 6–8; "No" is abnormal for items 1–5.

When determining the ideal cut-off score that would enable dichotomization of overall results into "normal" and "abnormal" ones, the priority was to achieve the highest possible sensitivity and negative predictive value. They were the highest for cut-off score = 1; sensitivity reached 95.5% (95% confidence interval [CI]: 84.9–98.7%) and negative predictive value reached 88.9% (95% CI: 67.2–96.9%).

Phase 2 focused on studying the effectiveness of education on the neurological NDST developed in Phase 1. As was mentioned, the total possible score of the eight-question knowledge post-test was 8 points. The median of the post-test was 6 points, the mode was 7 points (24.3% of the learners obtained this score), the average total score was 5.9 points, and the average success rate was 73.8%. For half of the questions, the success rate of the research sample was higher than 80%. The lowest success rate was 51.4% (for one question).

The centrepiece of Phase 3 entailed determining inter-rater reliability in a sample consisting of 42 patients with cerebrovascular accident. Inter-rater reliability of the dichotomized result and the individual items is in Table 2.

Tab. 2. Inter-rater reliability of the nursing dysphagia screening tool (N = 42)

Items	κ	p-value
Dichotomized result	0.264	0.047*
1. Ability to cough	0.724	< 0,001**
2. Ability to clench the teeth	-0.046	0.641
3. Symmetry / strength of the tongue	0.070	0.635
4. Symmetry / strength of facial muscles	0.324	0.013*
5. Shoulder symmetry / strength	0.540	0.001**
6. Dysarthria	0.583	< 0,001**
7. Aphasia	0.600	< 0,001**
8. Thickened liquid: cough	0.784	< 0,001**

N – the sample size; κ – coefficient kappa; * – the result (κ) is statistically significant for $p \leq 0.05$; ** – the result (κ) is statistically highly significant for $p \leq 0.01$.

DISCUSSION

The diagnostic parameters of the NDST developed in Phase 1 (Tab. 1) are just as high as the diagnostic parameters of several other, frequently cited foreign tools. For example, the Toronto Bedside Swallowing Screening Test (TOR-BSST) demonstrated 91–95% sensitivity and 89.5–93.3% NPV (Martino et al., 2009, p. 560). The Gugging Swallowing Screen (GUSS) had 100% sensitivity and NPV (Trapl et al., 2007, p. 2949). However, both screening tools were developed based on "gold standard" assessments involving a much smaller group of patients: Trapl et al.'s sample included 49 patients (2007, p. 2950) and Martino et al.'s sample included 68 patients (2009, p. 559) who underwent "gold standard" (FFES or videofluoroscopy) testing.

No screening tool was developed for the subset of patients with an ENT diagnosis (n = 38) because the two items with a statistically significant relationship to FEES (both were related to the thin liquid swallow test) contained a high percentage of missing data and for the third item with a statistically significant relationship to FEES, this relationship was negative. However, further research in patients with ENT diseases could focus on studying the relationship between the thin liquid swallow test conducted by nurses and an examination using a "gold standard" (e.g. FEES).

The results of Phase 2 suggest that the effectiveness of the education was not convincing. However, the test may have been difficult in comparison with other tests. For example, Cichero et al. also implemented an educational session on the correct use of a dysphagia screening tool; they used the true / false type of knowledge post-test, for which the probability to choose the correct answer to each question was as high as 50% (2009, p. 1652). The average score was 94% (Cichero et al., 2009, p. 1652) – it was much higher than the average score achieved in this study, which is not surprising since Cichero et al.'s (2009) post-test seemed to be much easier.

An interesting finding was that during the educational session, the students focused more on "technical" skills whereas the nurses focused on "cognitive" skills, i.e. on clinical reasoning and decision-making. Their goal was not to "master" the assessment techniques but rather to understand whether the presented activity made sense to them.

As was mentioned, Phase 3 focused on determining inter-rater reliability of the NDST. Inter-rater reliability of the dichotomized result was rather low (coefficient $\kappa = 0.264$; $p = 0.047$). However, for three assessment items, substantial agreement was obtained: "thickened liquid: cough" ($\kappa = 0,784$; $p < 0,001$) "ability to cough" ($\kappa = 0.724$; $p < 0.001$), and "aphasia" ($\kappa = 0.600$; $p < 0.001$). Average agreement was obtained for items "dysarthria" ($\kappa = 0.583$; $p < 0.001$) and "shoulder symmetry / strength" ($\kappa = 0.540$; $p = 0,001$). The remaining items had low or slightly negative agreement: ("symmetry / strength of facial muscles", "symmetry / strength of the tongue" and "ability to clench the teeth").

Future work could focus on efforts to improve inter-rater reliability of the NDST. One important factor that may have contributed to low overall agreement is the fact that one of the assessors was an experienced nurse (i.e. the principal researcher of all three phases of the study) with extensive training in nursing physical assessment; the other assessor was a university student enrolled in a master nursing study program, who had undergone training in Phase 2 of the study and additional one-day supervision by the first assessor at the bedside. This amount of training may not have been sufficient, especially in more complicated situations. For example, patients with neurological diagnoses may exhibit apraxia. In fact, managing "difficult" patient situations (such as apraxia) had not been included in the educational session; yet the presence of apraxia makes it more difficult to interpret the findings.

CONCLUSION

The eight-item nursing dysphagia screening tool described in this paper is the only dysphagia screening tool developed in the CR and based on a rigorously conducted research study. For neurological patients, its diagnostic criteria are excellent. However, implementation of the tool in practice is not easy. The content of the educational session may not be entirely adequate due to somewhat lower knowledge post-test results; at the same time, however, the post-test may have been too difficult. As the results of Phase 3 revealed, it could be beneficial to expand the educational session and include "difficult situations". In addition, nurses need to understand the rationale behind the tool's use in their daily practice before they are ready to learn the technical skills needed for correct tool administration.

The tool has already been implemented in selected Czech hospitals. Further recommendations for practice are expected because the use of the tool is studied in a project funded by the Internal Grant Agency of the Czech Ministry of Health, "Management of diagnostics and therapy of swallowing disorders" (Research and Development Council of the Czech Republic, 2013). It is hoped that in selected settings in the CR (such as stroke centres and neurological ICUs), nursing dysphagia screening will become an integral part of patient assessment.

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