



**STANDARDIZED SWALLOWING ASSESSMENT (SSA) DIAGNOSTIC TEST
FOR DYSPHAGIA SCREENING IN STROKE PATIENTS IN THE STROKE
CENTER TREATMENT ROOM**

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ABSTRACT

Stroke is the second leading cause of death in the world with cases continuing to increase every year, and one of the complications that often occurs is dysphagia, which can cause nutritional and respiratory disorders. Early detection of dysphagia through appropriate screening, such as the Standardized Swallowing Assessment (SSA), is very important to prevent further complications and improve the recovery of stroke patients.. Objective: to conduct diagnostic tests of the SSA assessment instrument for dysphagia screening in the Stroke Center room of Labuang Baji Hospital, South Sulawesi Province, Makassar. Method: In this study, a diagnostic test was used by measuring the sensitivity and specificity of the SSA instrument. The diagnostic test is a descriptive observational study with a cross-sectional study design. Results: The results of this study indicate that the sensitivity level of the SSA instrument reached 96.55% and the specificity level of the SSA instrument reached 87.5%. Conclusions: Dysphagia screening Standardized Swallowing Assessment (SSA) can be used as a standard instrument to identify dysphagia manifestations.

Keywords: dysphagia; screening; standardized swallowing assessment; stroke

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INTRODUCTION

Stroke is the second leading cause of death in the world and each year there is an increase of up to two million new cases (Wang et al., 2017). It is estimated that this incident will continue to increase due to the fact that some of the population will experience aging and the high prevalence of several diseases as risk factors such as hypertension, diabetes, smoking behavior, lack of exercise and inadequate treatment (Naghavi et al., 2017). When someone has a stroke, it will cause physical disabilities such as muscle weakness, especially in the facial area, which causes swallowing problems (dysphagia) (Marviana et al., 2020). Dysphagia is a common symptom found in patients with acute stroke and results in respiratory problems and nutritional deficiencies (Hines et al., 2016 ;Martino et al., 2005). Dysphagia disorders occur due to disorders in several cranial nerves including N.V Trigemini, N.VII Facial, N.IX Glossopharyngeal, N.X Vagus and N.XII Hypoglossus (Gillig & Sanders, 2010).

It is reported that the incidence of dysphagia reaches 37% - 78% in stroke patients and will improve several weeks after the stroke. However, more than 50% of patients experience persistent dysphagia disorders that cause nutritional disorders, respiratory disorders and have an impact on the length of hospitalization. Early treatment to identify early to prevent further complications (Zhao et al., 2022 ; Umay et al., 2021). Initial treatment of stroke patients requires the role of nurses in providing initial treatment <24 hours, such as early identification of swallowing difficulties and providing

implementation that is able to reduce further risks (Liu et al., 2016). One of the initial assessment efforts in determining a patient's swallowing status is through dysphagia screening. According to Palli et al., (2017) in the results of his research said that by conducting an initial assessment through dysphagia screening is very effective in preventing pneumonia. Likewise, research conducted by Cocho et al., (2017) that dysphagia screening can also reduce the incidence of broncho aspiration in stroke patients. Therefore, it is important to use proper dysphagia screening in conducting an assessment.

Instruments that can be used for dysphagia screening include: Standardized Swallowing Assessment (SSA), Massey Bedside Swallowing Screen (MBSS), Dysphagia Screening Tool Nursing Dysphagia Screening Tool (DST-NDST), Acute Stroke Dysphagia Screen (ASDS), Korean version of Standardized Swallowing Assessment (K-SSA), Yale Swallow Protocol and Nurse Dysphagia Screen Tool (NDST) (Jiang et al., 2016). Standardized Swallowing Assessment (SSA) In addition to being used to assess the patient's swallowing status, it can also be used to assess general conditions such as the level of consciousness to ensure that patients, especially stroke patients, have good physical health. This instrument assesses breathing, voice control, saliva, coughing ability, sucking water from a spoon and from a glass. (Perry, 2001). According to research conducted by WU et al., (2008) in their research results, it was stated that the SSA instrument has satisfactory validity and reliability, as well as higher sensitivity and specificity compared to other dysphagia instruments and is highly recommended for use in stroke cases.

From the results of observations that have been carried out in the stroke room of the Labuang Baji Hospital, South Sulawesi Province, Makassar, it was found that an assessment of swallowing status/dysphagia screening had been carried out on patients in the Emergency Room (IGD) but there was no standard instrument used. Most nurses said that there was no standard instrument used in the patient's medical record. The recommended instruments for identifying dysphagia based on their sensitivity and specificity levels are MBSS and SSA. However, in the implementation of MBSS, it must be carried out by speech-language pathologists (SLP) using sophisticated and certified tools. SLP is currently still very difficult to find in developing countries, while SSA is highly recommended because it is carried out by nurses and is easy to do in accelerating the screening process for inpatients (Jiang et al., 2016). Therefore, accurate assessment especially the patient's swallowing status before providing intervention related to swallowing (eating and drinking) is important to do. Therefore, the purpose of this study was to conduct a diagnostic test of the SSA assessment instrument for dysphagia screening in the Stroke Center room of RSU Labuang Baji, South Sulawesi Province, Makassar. This study was conducted with the aim of developing a Standard Operating Procedure (SOP) for the application of the SSA instrument to identify dysphagia in stroke patients.

METHOD

In this study, a diagnostic test was used by measuring the sensitivity and specificity of the SSA instrument. The diagnostic test is a descriptive observational study with a cross-sectional study design. This application is classified as descriptive observational because only observations are made without any intervention (treatment). The data collected were then analyzed, coded, tabulated, entered into excel, then a diagnostic test was carried out which was displayed in a 2x2 table.

Table 1.
Diagnostic Test

| SSA | RM | | Amount |
|----------|----------|----------|---------------|
| | Positive | Negative | |
| Positive | a | b | a + b |
| Negative | c | d | c + d |
| Amount | a + c | b + d | a + b + c + d |

Next, calculate sensitivity and specificity. Sensitivity is the proportion of subjects diagnosed with positive diagnostic test results (true positives) compared to all sick subjects (true positives + false positives). While Specificity is the proportion of healthy subjects who give negative diagnostic test results (true negatives) compared to all subjects who are not sick (true negatives + false positives).

RESULT

The implementation of EBNP was carried out from April 29, 2024 to May 30, 2024, which was carried out in the Stroke Unit of the Labuang Baji General Teaching Hospital, South Sulawesi Province, Makassar City. The implementation of this EBNP action involved 37 respondents who were screened for dysphagia using the Standardized Swallowing Assessment (SSA) instrument. Dysphagia screening using SSA was carried out to assess the clinical symptoms of dysphagia experienced by stroke patients. This dysphagia screening was carried out only once for each patient by making an assessment based on the screening SOP used. The process of implementing EBNP begins with a discussion with the head of the room and the implementing nurse about the problems that are often encountered in the treatment room, especially for stroke patients. This is continued by identifying problems in the stroke unit room. From the identification results, it was found that there was no standard instrument in conducting an assessment of dysphagia. After that, an article review was conducted to identify evidence-based screening tools for use. The results obtained one article that recommended SSA as an instrument for dysphagia screening.

Continued discussion with the head of the room and the implementing nurse about the instrument that will be used to conduct dysphagia assessment. After approval, continued socialization to the nursing field, head of the room and implementing nurse in the Stroke Unit room as the place of implementation (Attachment 1). Then continued by conducting informed consent to the patient and family about the actions to be taken. Furthermore, respondent screening was carried out according to the inclusion criteria which was continued by conducting dysphagia screening. In the implementation of this SSA screening, nurses on duty in the room were also involved in assisting and conducting the screening. Nurses who were actively involved in the implementation of this screening were 3 people, but most of the nurses on duty in the room when the assessment was carried out had been exposed to the implementation of screening using this SSA. The implementation of dysphagia screening carried out on patients never exceeded 10 minutes per patient. In the implementation of dysphagia screening, one of the obstacles often encountered when patients were given a semi-Fowler position was that they sometimes complained of dizziness because of the long-standing curtain. So it takes time to get patients used to the semi-Fowler position. So there are several patients who are treated in a supine position. In addition, the assessment carried out with this dysphagia screening does not require a large cost in its implementation. The collected SSA screening results were then analyzed, coded, tabulated and entered into excel and then a diagnostic test was performed which was displayed in a 2x2 table. The results of the EBNP application are presented in the following sub-chapters:

Table 2.
Frequency Distribution of Respondent Characteristics Based on Gender, Age and Education Data in the Stroke Unit (n=37)

| Respondent Characteristics | Respondents |
|----------------------------|---------------|
| | Mean (SD)/n % |
| Gender | |
| Male | 14 (37.8%) |
| Female | 23 (62.2%) |
| Age | 52.32 |
| Education | |
| Low Education | 15 (46.87%) |
| Higher Education | 22 (54.45%) |

Abbreviations: Number of samples (and);

Standard deviation (SD);

Note: Low education (Elementary, Middle School, High School/Equivalent);

Higher education (Diploma and Bachelor).

Data analysis based on respondent characteristics shows that most patients are female (62.2%). Characteristics based on age obtained an average of 52.32 years while for education level with the highest number at the higher education level (54.45%).

Table 3.
Results of Standardized Swallowing Assessment (SSA) and Medical Records (MR) Screening Assessment in the Stroke Unit (n=37)

| SSA | GM | | Total |
|--------------|--------------------------------------|-------------|--------------|
| | Positive | Negative | |
| Positive | 28 76,67% | 1 2.70% | 29 78.37% |
| Negative | 1 2.70% | 7 18.91% | 8 18.91% |
| Total Sample | 29 78.37% | 8 18.91% | 37 100% |
| Sensitivity | $S = \frac{28}{28 + 1} \times 100\%$ | | 96,55% |
| Specificity | $S = \frac{7}{1 + 7} \times 100\%$ | | 87,5% |

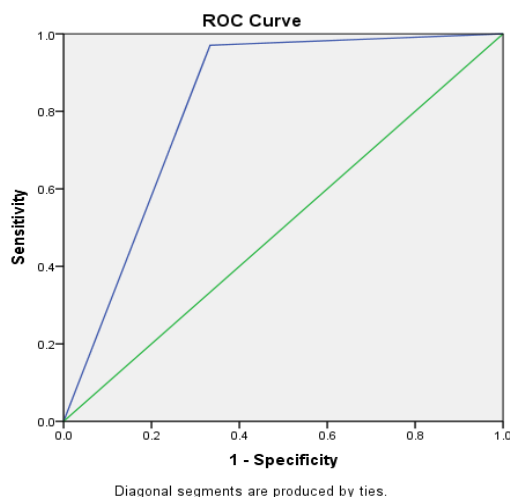
Table 3 shows that from the number of patients who underwent dysphagia screening, there were 37 people. Based on the screening results obtained using the 2x2 table above, true positive results were obtained in 28 patients (76.67%), false positive results in 1 patient (2.70%). While true negative results were in 7 patients (18.91%) and false negative results in 1 patient (2.70%).

Table 4.
Results of the Assessment of Sensitivity, Specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), Positive likelihood ratio (LR+) and Negative likelihood ratio (LR-) of dysphagia screening.

| Parameter | % |
|-------------|-------|
| Sensitivity | 96.55 |
| Specificity | 87,5 |
| PPV | 96,55 |
| NPV | 87,5 |
| LR+ | 7.72 |
| LR- | 0.03 |

The results of the analysis obtained the sensitivity of the dysphagia screening instrument using the Standardized Swallowing Assessment (SSA) with the gold standard of doctor's

diagnosis of 96.55%. While the specificity of the dysphagia screening instrument using the Standardized Swallowing Assessment (SSA) with the gold standard of doctor's diagnosis was 87.5%. For the positive predictive value (PPV) of 96.55%, which indicates that the SSA dysphagia screening used has good diagnostic performance and a negative predictive value (NPV) of 87.5%. With these PPV and NPV results, it shows that the SSA instrument can be used as a good diagnostic screening tool because its detection prediction rate is quite good. Based on the results of the LR+ analysis on SSA of 76.72, which shows that every 1 false positive from SSA will be found 8 true positive results of SSA. While the LR- results on SSA are 0.03, which shows that every 1 false negative result will be found 10 true negatives on SSA. This shows that the higher the LR+ value and the lower the LR- value, the SSA is considered good for detecting dysphagia.



Based on the Area Under Curve the x-axis shows that one minus specificity is the false positive rate and the y-axis gives the sensitivity. To determine the point on the curve with low sensitivity and specificity of one minus the closer to the upper left corner the better. This looks like an ideal point. The area under the curve is 0.812 which is above 0.5 equals chance and is represented by the reference line of the curve coordinates showing sensitivity and one minus specificity for various cut points. The results show that the AUC value is wide enough so that the ability of this SSA screening can be used to detect dysphagia.

DISCUSSION

Stroke is a perfusion disorder caused by cerebral vascularization. Stroke is also the most dominant cause of disability in sufferers (Caplan et al., 2023). The application of EBNP shows that the majority of genders who are patients in EBNP are women, 23 people (62.1%), while men are 14 people (37.9%). Based on data from World Health Statistics (2022), it states that the incidence of stroke in the world is more dominant in women than men. The incidence of stroke is also influenced by several factors, including age. The implementation of EBNP obtained characteristics based on age ranging between 46-55 years. According to Maburri et al., (2020) stated that the incidence of stroke is related to the incidence of stroke but other factors are needed such as comorbidities including hypertension, diabetes and other diseases. Nakayama et al., (1994) stated that age is not the main risk factor in causing stroke because other accompanying factors are needed, causing a high risk of stroke.

One of the common symptoms found in stroke patients is the manifestation of dysphagia. Dysphagia is a condition that can worsen the patient's condition which can be life-threatening for the patient (Hines et al., 2011). To anticipate these conditions, an initial assessment is needed to prevent further complications. The results of the application of

EBNP dysphagia screening using the Standardized Swallowing Assessment (SSA) instrument obtained quite high sensitivity and specificity analysis test results. This is also what was expressed by Jiang et al., (2016) that the SSA screening tool carried out by nurses directly to detect dysphagia has high psychometric quality with a sensitivity result of 97% and a specificity result of 90%. These results indicate that this SSA screening tool has a fairly high sensitivity and specificity value in assessing the accuracy in identifying patients with dysphagia. In line with the research conducted by Leeftang et al., (2013) that the use of screening tools must have high sensitivity and specificity values in order to produce accurate examination results. In addition, SSA screening is also a simple screening tool and easy to use by nurses. In addition, simple instructions in the SSA instrument can guide nurses in conducting tests and provide instructions for referral to SLP and dietary modifications that are given (Jiang et al., 2016).

The implementation of dysphagia screening using SSA involved all nurses on duty in the room when the assessment was carried out. During the assessment, no significant obstacles were found that caused complications in stroke patients. This dysphagia screening was carried out after an examination using the golden standard at the hospital when the patient was admitted to the hospital. The assessment of all patients was carried out with a duration of no more than 10 minutes for each patient. According to Donovan et al., (2013) the ideal dysphagia screening tool is a tool that is easy and quick to use and is able to accurately determine the possibility of dysphagia symptoms and aspiration while providing safety in the patient's nutritional intake. Where the implementation of this assessment begins with a therapeutic greeting which is continued with informed consent to ask for the patient's and family's approval. Furthermore, an assessment is carried out with 5 phases. The first phase begins by assessing the patient's level of consciousness by looking at the patient's response. If the patient's condition with a good level of consciousness is continued with the second phase, namely by assessing the strength of the muscles in the mouth and tongue which is continued with the third phase to assess the patient's speech sound.

In the fourth phase, an assessment is carried out by assessing the patient's swallowing ability in stages using a teaspoon. After everything is done, the final phase concludes the screening results, whether they are positive for dysphagia or negative. The assessment carried out using SSA screening is very effective and efficient in conducting the assessment and is easy for nurses to do. In line with research conducted by Logemann et al., (1999), it was stated that a screening tool, especially in identifying dysphagia, must be easy to perform and have high sensitivity for assessing dysphagia patients. The implementation of dysphagia screening has also involved most of the implementing nurses. However, there are only 3 nurses actively involved in the assessment. Therefore, it is necessary to provide assistance to implementing nurses, especially in the stroke treatment room and in the Emergency Room (IGD). So that in its implementation, all nurses are able to use the instrument to identify dysphagia earlier in preventing other complications.

CONCLUSION

The results of this study indicate that the Standardized Swallowing Assessment (SSA) dysphagia screening can be used to identify dysphagia manifestations because it has a good sensitivity value of 96.55% and specificity of 87.5%. The strength in diagnosing dysphagia based on the AUC value of 0.819 which is included in the high category. So this Standardized Swallowing Assessment (SSA) screening instrument can be recommended for use as a standard instrument in conducting assessments to diagnose dysphagia cases.

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