Efficacy of Manipal Manual of Swallowing Assessment in Identifying Aspiration

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Abstract: *Background*: There are also many formal assessment tools available for the assessment of swallowing. Among these, there are few published clinical dysphagia assessment tools that provide detailed assessment of swallowing. One of the tool which has been psychometrically validated and standardized for the Indian population is Manipal Manual for Swallowing Assessment (MMSA) which involves the assessment of structure, sensory and motor functions along with trial feed. This test is used in the present study to check for its efficacy in the identification of aspiration.

Method: A total of 25 individuals participated in the study. All the individuals were diagnosed to have Dysphagia based on MMSA [35]. All the 25 individuals underwent MMSA test. Individuals with suspected aspiration and no aspiration were identified by experienced speech pathologists in the field of swallowing disorders. All these individuals were subjected to videofluroscopy testings to confirm aspiration. Concurrent validity for MMSA was established through the measurement of sensitivity, specificity, positive predictive value, negative predictive value and the efficiency.

Results: Results revealed that 77% of the individuals with aspiration were actually aspirators whereas 67 % of the predicted individuals with no aspiration were actually the non aspirators and hence this test can be used to identify individuals with aspiration with overall efficiency of 72 %.

Conclusions: Results revealed a high sensitivity and specifivicity for MMSA. Thus, MMSA is proven a valuable tool in the dysphagia assessment, in particularly aspiration

Keywords: MMSA, Aspiration, Swallowng assessment.

INTRODUCTION

Swallowing is defined as the semiautomatic motor action of the muscles of respiratory and gastrointestinal tract that propels the food from the oral cavity into the stomach [1]. This act involves four stages: oral preparatory, oral transport, pharyngeal and esophageal stages; and these four stages must work in an integrated manner for a safe swallow. Swallowing is also a complex phenomenon involving respiration, phonation and swallowing occurring at the same anatomic location, requiring coordination with each other, for a safe swallow and proper exchange of gases [2].

Swallowing problems are often encountered by speech pathologists in their clinical practice. Byles has reported that in United States alone 15 million individuals suffer from dysphagia every year [3]. Swallowing problems can manifest in the form of drooling, food pocketing, aspiration, undernutrition, etc with one or more underlying pathophysiology. These symptoms increase the risk for aspiration pneumonia, which is often associated with increased mortality rate. Hence, it is important to identify the symptoms of dysphagia at an early stage and intervene without delay in order to prevent the adverse complications. Identification of dysphagia is an organized and goal directed process covering various components of swallowing. The goals of the swallowing assessment include characterizing the abilities and impairments in the swallowing process, determining underlying pathophysiology, and the degree to which these impairments can be modified. Swallowing can be assessed with qualitative as well as quantitative measures.

Qualitative assessment involves the use of a subjective interpretation or observation as a tool in the evaluation of swallowing, aiming at characterizing the nature and extent of the problem. Every aspect in this process is planned to address the issues of nutritional status, swallow safety, diet modifications, suggestions for non oral feeding, and the need for further instrumental assessment. Various assessment protocols are available in the literature for screening as well as comprehensive evaluation, focusing on various aspects of swallowing such as trial swallows or oral sensory assessment and/or oromotor assessment.

Dysphagia related to oral preparatory and oral phase can be identified easily with visual examination of the oral mechanism with and without food. However assessment of pharyngeal phase poses special

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challenge owing to poor visibility and involuntary action, and so research focus in the west has aimed at exploring the pharyngeal stage of dysphagia.

Attempts have been made to identify the risk for aspiration using various clinical factors affected in individuals with dysphagia. Linden and Siebens investigated fifteen individuals with pharyngeal stage dysphagia using sensorimotor examination. Higher incidence of impaired pharyngeal gag and wet gurgly voice quality was observed in many individuals exhibiting laryngeal penetration on motion fluroscopy. It was concluded that cough was not a reliable predictor for laryngeal penetration instead, it was recommended to use motion fluoroscopy for the identification of penetration [4]. Dysphonia and weak cough were reported to be the significant predictors of aspiration using videofluroscopy and clinical swallow examination [5].

DePippo *et al*. used 3-oz water swallow test to conclude that cough during swallow and post swallow gurgly voice were the clinical predictors of aspiration [6]. Horner, Brazer and Massey examined thirty eight individuals with bilateral stroke and found that abnormal voluntary cough and absent gag reflex significantly correlated with aspiration on videofluroscopy [7]. But Stanners, Chapman and Bamford reported association only between weak voluntary cough and aspiration [8]. Gag reflex was recognized to be absent in 30% of healthy young adults and 44% of healthy old adults [9]. This suggests that gag reflex cannot be considered as a sole predictor of aspiration and also, absent pharyngeal sensation was uncommon in normal individuals.

Daniels and Collegues investigated the clinical factors associated with the identification of dysphagia severity. Oropharyngeal evaluation and videofluroscopic investigations were completed on fifty nine individuals with dysphagia. Oropharyngeal evaluation included the identification of clinical features such as dysphonia, abnormal volitional cough, dysarthria, cough after swallow, abnormal gag reflex, and gurgly voice after swallow. The results of videofluroscopy was scored on a five point rating scale (0=normal, 1=mild, 2=moderate, 3=moderately severe, 4=severe) for the assessment of dysphagia severity. Results of logistic regression analysis indicated that abnormal volitional cough and cough while swallowing could predict aspiration with 78% accuracy and these clinical features could differentially diagnose those individuals with moderate to severe dysphagia from individuals with mild dysphagia and normal swallowing [10-11]. Smithard *et al*. reported that altered consciousness level and weak voluntary cough could predict aspiration. This combination gave 75 % sensitivity, 72% specificity, positive predictive value of 41% and negative predictive value of 91% for aspiration in videofluroscopy [12].

The ability to cough was also used as a clinical factor to determine the risk for aspiration. In this regard, Addington, Stephens, Gilliland and Rodriguez examined acute stroke individuals using cough test. This test used nebulized tartaric acid for the assessment of laryngeal cough reflex. Results indicated that a normal cough after an acute stroke was associated with lower risk for developing aspiration [13]. A weak or absent cough indicates a significant risk for aspiration. McCullough, Wertz and Rosenbek investigated the clinical predictors of aspiration in sixty individuals with dysphagia due to acute stroke. These individuals underwent clinical swallowing and videofluroscopic examinations. Clinical swallowing examination included information on case history, assessments on oral motor, speech praxis, trial swallows and voice. Results revealed that cough while swallowing is a reliable predictor of aspiration i.e., those individuals who coughed during swallowing had aspiration on videofluroscopy. Authors have cautioned the use of clinical swallowing examination [14].

Water swallowing test and swallowing provocation test was the focus of investigation in few studies to determine the risk for aspiration in individuals with dysphagia. Teramoto and Fukuchi examined twenty-six individuals with stroke and aspiration pneumonia and twenty six age-matched stroke individuals without aspiration pneumonia using Water swallowing test and swallowing provocation test. Water swallowing test was performed by asking the individuals to drink 10 and 30 ml of water from a plastic cup within 10 secs. Individuals who drank water without aspiration and without any interruption were considered normal. Swallowing provocation test was performed by injecting water into the suprapharynx. Individuals were considered normal if the swallowing reflex was elicited within 3 secs. Sensitivity and specificity for the first-step water swallowing test in the detection of aspiration were found to be 71.4% and 70.8%, respectively. However, second-step water swallowing test using 30 ml of water gave the sensitivity and specificity of 72% and 70.3%, respectively. Similarly, 100% sensitivity and 83.8% specificity were obtained for first step swallowing provocation test for the detection of

aspiration. However, sensitivity decreased to 76.4% and specificity increased to 100% for the second-step swallowing provocation test. Finally authors have concluded that swallowing provocation test is better than water swallowing test in differentiating individuals with and without predisposition for aspiration [15].

Few researchers have investigated the role of pharyngeal and laryngeal sensation in the identification of aspiration. One such study by Kidd, Lawson, Nesbitt and MacMahon used videofluroscopy and bed side water swallowing test to evaluate aspiration in sixty individuals with acute stroke. Results of Videofluroscopy revealed aspiration for twenty five individuals. Of these twenty five individuals, twenty of them did not have overt dysphagia as assessed through bedside water swallowing test. In all the individuals with stroke who aspirated on videoflurocopy, pharyngeal sensation was absent indicating clinical significance of assessing pharyngeal sensation in the clinical swallow examination [16]. Aviv and his collegues stimulated the laryngeal mucosa endoscopically through the air pulses and attempted to determine sensory discrimination thresholds in eighteen stroke individuals and eighteen age matched controls. These individuals were followed for a period of one year and the results indicated that most individuals with clinical dysphagia had sensory deficits and those with severe sensory deficits exhibited aspiration on follow up visits. However, sensory deficits were also found in acute stroke individuals without clinical dysphagia and it was recommended that silent sensory impairments may possibly predispose the individuals to develop aspiration [17-18]. Bastian and Riggs anesthetized the oral cavity, hypopharynx and larynx using lidocaine injection in thirteen healthy adults. Results revealed that normal swallowing did take place even in the presence of complete local anesthesia. [19]

Swallowing problems were also determined by temporal measures of swallowing. Hinds and Wiles investigated the risk for swallowing using timed test of swallowing. This particular test gives information about swallow time, volume of bolus per swallows and swallowing capacity. Findings revealed that delayed swallowing, coughing, and/or dysphonia indicated swallowing problems in acute stroke individuals. Those individuals in whom a swallowing rehabilitation was suggested, 97% had an abnormal quantitative water swallowing. They concluded that the timed test of swallowing can be a useful screening tool for swallowing assessment with 69% specificity and may be used for referring patients to a speech pathologist after acute stroke [20].

The validity of these clinical factors has been correlated with Videofluroscopy for the reliable detection of aspiration. However, sensitivity and specificity of these clinical factors revealed varied findings in the range between 42% and 92%. Positive predictive value for clinical swallowing examination ranged from 50% to 75% whereas the negative predictive values ranged from 70% to 90% [11-12; 21-22] Interjudge and intrajudge reliability for clinical examination also varied significantly across the studies [12, 14, 23, 24]

Though the sensitivity and specificity of these clinical swallowing examinations vary widely, they are still used in the assessment of individuals with dysphagia. Of late, there has been an increasing interest in refining these clinical factors and formulating the diagnostic procedures, with the goal of eliminating the need for a videofluroscopic study or other instrumental procedures. Some of these tools target the oral preparatory and oral phase whereas others target the pharyngeal phase of swallowing.

There are also many formal assessment tools available for the assessment of swallowing. Some of them use trial swallows [25-29] and some do not incorporate trial swallows [30-34]. Among these, there are few published clinical dysphagia assessment tools that provide detailed assessment of swallowing. One of the tool which has been psychometrically validated and standardized for the Indian population is Manipal Manual for Swallowing Assessment (MMSA) (Balasubramanium & Bhat, 2012) [35] which involves the assessment of structure, sensory and motor functions along with trial feed. This test is used in the present study to check for its efficacy in the identification of aspiration.

METHOD

This study was conducted in the department of Audiology and Speech Language Pathology at Kasturba Medical College, Mangalore. The study protocol was approved by the Institutional ethics committee at Kasturba Medical College, Mangalore.

Subjects

Human volunteers were recruited for the study. A total of 25 individuals participated in the study. All the individuals were diagnosed to have Dysphagia based

on MMSA as shown in the appendix [35]. Informed consent was obtained from each individual prior to the conduction of the study.

Procedure

The study followed the cross sectional studygroup design. In the present study, all the 25 individuals underwent MMSA test. Individuals with suspected aspiration and no aspiration were identified by experienced speech pathologists in the field of swallowing disorders. All these individuals were subjected to videofluroscopy testings to confirm aspiration.

Statistical Analysis

a. *Descriptive statistics:* Descriptive statistics were employed to describe all the qualitative parameters under consideration. The mean and standard deviation for each measure was obtained.

b. Concurrent validity for MMSA was established through the measurement of sensitivity, specificity, positive predictive value, negative predictive value and the efficiency.

RESULTS

The present study investigated the efficacy of MMSA in identifying aspiration. For this, MMSA and videofluroscopy was administered on 25 individuals with dysphagia. Results of Descriptive statistics for MMSA are as follows.

From the Table **1**, it can be inferred that individuals with dysphagia had increased scores in each subsection compared to that of normative values and these differences were significant at $p<0.05$.

The sensitivity of the protocol in the identification of aspiration was compared with Videofluroscopy to ascertain if the protocol accurately identifies aspiration or not. In this way, concurrent validity can be established. The results are as follows.

From the Table **2**, it is evident that among 14 individuals identified as having aspiration using MMSA, 10 were actual aspirators and the remaining four were non aspirators as ascertained through videofluroscopy. Similarly, among the 11 individuals identified as non aspirators using MMSA, 8 were non aspirators and the remaining three were actual aspirators as ascertained through videofluroscopy. Thus, it is said that 77% of the individuals with aspiration were actually aspirators whereas 67 % of the predicted individuals with no aspiration were actually the non aspirators and hence this test can be used to identify individuals with aspiration with overall efficiency of 72 %.

DISCUSSION

The aim of the study was to check the efficacy of MMSA in identifying aspiration. All the individuals with mechanical and neurogenic dysphagia were subjected to MMSA and videofluroscopy for the assessment of aspiration. The results revealed that the protocol was able to identify dysphagia in various sections of the protocol depending on the impairment. It is understood that these individuals with neurogenic and mechanical

Table 1: Descriptive Statistics for MMSA in Individuals with Dysphagia

Scores	Mean	SD
Sensory assessment	2.5	1.91
Motor assessment	34	8.76
Phases of swallowing assessment	18	14.14
Total scores	52.50	31.82

Table 2: Results of Concurrent Validity

Videofluroscopy	Protocol		Total
	Positive for aspiration	Negative for aspiration	
Positive for aspiration	10 (40%)	3 (12%)	13 (52%)
Negative for aspiration	4 (16%)	8 (32%)	12 (48%)
Total	14 (56%)	11 (44%)	25

Sensitivity: 77%; Specificity: 67%; Positive predictive value: 71%; Negative predictive value: 73 %; Efficiency: 72%.

dysphagia exhibit difficulties with various sections of MMSA.

Both types of dysphagia exhibited more problems in motor assessment and phases of swallowing assessment than the sensory assessment. Only few individuals with dysphagia exhibited sensory impairment and these sensory impairments were restricted to absence of gag reflex. Some of the individuals with dysphagia were identified to have aspiration. However, the reliability of aspiration detection using MMSA is a questionable and hence there is a need to validate the aspiration detection using MMSA.

The sensitivity of the test in the detection of aspiration was compared with the Videofluroscopy results to ascertain whether the protocol accurately identifies the presence of aspiration. This kind of comparison provides a measure of concurrent and criterion validity. The results revealed the following, sensitivity: 77%; Specificity: 67%; Positive predictive value: 71%; Negative predictive value: 73 %; and Efficiency: 72%. This indicates that the protocol is sensitive in the identification of aspiration in individuals with dysphagia. Longitudinal follow up of these patients during their therapy visits also revealed that the developed protocol was also able to predict changes during the course of therapy and hence this protocol would be of significance in identifying individuals with dysphagia and monitoring the progress during the intervention process.

In a nutshell, MMSA enables the clinicians to identify the presence of dysphagia, to establish possible etiology for dysphagia in relation to swallowing physiology, to assess the ability to identify aspiration, to determine the possibility for oral feeding and to make recommendations regarding the alternative feeding methods and to determine the need for further instrumental evaluation. This protocol provides the qualitative evaluation of elements of dysphagia which can be quantified. It was designed to be administered to all the types of individuals with dysphagia above 18 years of age. The normative data has been established across four different age groups and gender. The same was also administered on a range of pathological conditions (Mechanical dysphagia caused by glossectomy, mandibulectomy etc; neurogenic dysphagia caused by stroke; lateral medullary syndrome; respiratory disorders and psychogenic dysphagia). It was concluded that administering this protocol to all types of dysphagia is appropriate to determine the level of swallowing ability/disability.

SUMMARY & CONCLUSIONS

The present research investigated the efficacy of MMSA in identifying aspiration. MMSA and videofluroscopy was administered on 25 individuals with neurogenic and mechanical dysphagia in the age range of 18-76+ years. Results revealed a high sensitivity and specifivicity for MMSA. Thus, MMSA is proven a valuable tool in the dysphagia assessment, in particularly aspiration. However the limitation is that the MMSA needs to be administered on a larger sample of individuals with different types of dysphagia which might provide insight into the pattern of swallowing behavior across a range of swallowing problems in different clinical population.

APPENDIX

Manipal Manual for Swallowing Assessment (MMSA)

Name: Date:
Hospital No:
Age/Sex:
Primary diagnosis:
Secondary diagnosis:

General History:

Language and cognition:

Is the individual cooperative? Yes/No/Partial
Is the individual well oriented? Yes/No/Partial
Is the individual able to follow instructions? Yes/No/Partial
What are the individuals' difficulties with verbal expression?

Oral feeds:

What are the individuals' current difficulties with eating and/or drinking?
When did these difficulties begin?
Has the individual lost weight after that? Yes/No
If yes, how much weight has he/she lost in last one month?
What is his/her present weight?
Does the individual have pain during swallowing? Yes/No
Does the individual complaint of dryness in the mouth? Yes/No
Does the individual appreciate taste while eating? Yes/No
Does the individual appreciate temperature while eating? Yes/No

Consistency:

Does he/she have the same food (type or consistency) like others in the family? Yes/No/Somewhat
If no specify the modifications made
What consistency of food is he/she comfortable/safe with-- (regular liquid/thickened liquid/soft food/regular food)?

Quantity and Frequency of Eating:

How is the individuals' appetite? Reduced/Normal/Excessive
Does he/she prefer piecemeal in a day? Yes/No
If Yes, How many times does she consume meals in a day?

Utensils:

Does he/she use specialized utensils while taking food? Yes/No
If yes, specify the type of specialized utensils

Posture:

How is the individual positioned while eating/drinking? Normal/ Modified
If modified, describe

Time:

Does he/she match others in the family for the feeding time? Yes/No/prolonged

Dependency:

Does the individual self feed? Yes/No
Does the individual use any non oral feeding methods? Yes/No
If yes, what is the type of non-oral feeding?
What is the duration of non-oral feeding?
Is the individual ventilator dependent? Yes/ No
If yes, what is the reason for ventilation?
How long was the individual on ventilation?
Is the individual on Tracheostomy tube? Yes/ No
If yes, what is the reason for tracheotomy?
When was the tube placed?
What is the type of tracheostomy tube?
Is there requirement of suctioning? Yes/No
If yes, how frequent is it done?

Social Eating:

Does the individual eat with others in the family? Yes/No
Does the individual prefer to eat with Television/Book? Yes/No
Does the individual manage himself/herself in mealtime gatherings? Yes/No

SUBSCALE 1: ASSESSMENT OF STRUCTURE

Observations: Observe the articulators at rest for structural abnormalities.

Lips: Symmetry/asymmetry, deviations to the left/right, tremor, fasciculations, cleft lip

Tongue: Symmetry/asymmetry, deviations to the left/right, tremor, fasciculations, cleft, microglossia, macroglossia, scarring, any surgical reconstruction

Soft palate: Symmetry/asymmetry, deviations to the right/left, cleft of the soft palate, short soft palate

Jaw: Symmetry/asymmetry, deviations to the right/left, cleft, micrognathia, macrognathia, prognathia, retrognathia, trismus

Teeth: Dental caries, teeth cavity, missing teeth, supernumerary teeth, under bite, over bite, open bite, cross bite

Cheeks: Cleft

Any other: Look out for any other features interfering with swallowing

SUBSCALE 2: ASSESSMENT OF FUNCTION

2A. Sensory Assessment

Sensory assessment					
Cranial nerve (CN)	**Sl.No**	**Structure**	**Instructions**	**Normal**	**Impaired**
V	1	Right upper lip	Light touch		
	2		Touch with deep pressure		
	3	Left upper lip	Light touch		
	4		Touch with deep pressure		
	5	Middle upper lip	Light touch		
	6		Touch with deep pressure		
	7	Right lower lip	Light touch		
	8		Touch with deep pressure		
	9	Left lower lip	Light touch		
	10		Touch with deep pressure		
	11	Middle lower lip	Light touch		
	12		Touch with deep pressure		
	13	Right upper gums	Light touch		
	14		Touch with deep pressure		
	15	Left upper gums	Light touch		
	16		Touch with deep pressure		
	17	Upper middle gums	Light touch		
	18		Touch with deep pressure		
	19	Right lower gums	Light touch		
	20		Touch with deep pressure		
	21	Left lower gums	Light touch		

	22		Touch with deep pressure		
	23	Lower middle gums	Light touch		
	24		Touch with deep pressure		
	25	Upper right cheeks	Light touch		
	26		Touch with deep pressure		
	27	Lower right cheeks	Light touch		
	28		Touch with deep pressure		
	29	Upper left cheeks	Light touch		
	30		Touch with deep pressure		
	31	Lower left cheeks	Light touch		
	32		Touch with deep pressure		
	33	Right anterior 2/3rd of the tongue	Light touch		
	34		Touch with deep pressure		
	35	Left anterior 2/3rd of the tongue	Light touch		
	36		Touch with deep pressure		
	37	Tip of the tongue	Light touch		
	38		Touch with deep pressure		
	39	Left hard palate	Light touch		
	40		Touch with deep pressure		
	41	Right hard palate	Light touch		
	42		Touch with deep pressure		
	43	Middle hard palate	Light touch		
	44		Touch with deep pressure		
	45	Soft palate	Light touch		
	46	Upper incisor teeth	Light touch		
	47	Lower incisor teeth	Light tough		
IX	48	Posterior 1/3rd of the tongue	Light touch		
Total					

2B. Motor Assessment

Motor assessment						
Structure	**Cranial Nerve**	**Tasks**	**Instructions**	**0**	**1**	**2**
Lips	VII	Protrusion	Pucker your lips			
		Retraction	Pretend a broad smile			
		Alternating tasks	Alternate these protrusion and retraction postures rapidly			
		Lip strength	Hold the spoon with the lips while the spoon is being pulled out			
Tongue	XII	Protrusion	Extend the tongue out of the mouth as far forward as possible			
		Retraction	Retract the tongue as far backward as possible			
		Lateral	a) Touch the right corner of the lips with the tongue			
			b) Touch the left corner of the lips with the tongue			
			c) Alternate these lateral movements as fast as possible			

			d) Touch right side of the cheek from inside with the tongue			
			e) Touch left side of the cheek from inside with the tongue			
			f) Alternate these lateral movements as fast as possible			
		Anterior elevation	Raise the tongue tip to the alveolar ridge			
			Rapidly alternate same movements			
		Posterior elevation	Raise the back of the tongue to the palate			
			Rapidly alternate same movements			
		Tongue strength	Push the tongue depressor up with your tongue while the tongue depressor is being pressed on the tongue tip			
		Tongue sweep	Sweep the tongue on the upper teeth			
			Sweep the tongue on the lower teeth			
Soft Palate	X	Elevation	Say /a/ repeatedly with an interval of 1 seconds			
Jaw	V	Mouth opening & closing	Open the mouth widely and close the mouth			
		Left	Move the jaw to the left side			
		Right	Move the jaw to the right side			
		Strength	Open the mouth while the jaw is being pushed up.			
Cheeks	VII	puff the cheeks	Puff the cheeks on right side			
			Puff the cheeks on left side			
			Puff the cheeks on both the sides			
Pharynx	IX	Pharyngeal wall movement	Swallow while the tongue is protruded out			
Larynx*	X	Voluntary cough	Cough as strongly as possible			
		Voice	Turn the head towards right and say /a/ continuously for 3 sec			
			Turn the head towards left and say /a/ continuously for 3 sec			
			Keep the head in the centre and say /a/ continuously for 3 sec			
Total						

*If the client is tracheostomized, ask him to inhale, close the stoma and perform the tasks.

SUBSCALE 3: ASSESSMENT OF PHASES OF SWALLOWING

	Tasks	**Observations**	**0**	**1**	**2**
Dry swallow	Pretend a swallow	Laryngeal elevation			
Thick Liquid*	Swallow 5ml of thick liquid	Lip seal			
	Swallow 10 ml of thick liquid	Managing secretions (loss from the mouth i.e., drooling)			
		Nasal regurgitation			
		Oral transit			
		Laryngeal elevation			
		Post swallow voice			
		Cough			
Thin Liquid *	Swallow 5ml of thin liquid	Lip seal			

	Swallow 10 ml of thin liquid	Managing secretions (loss from the mouth i.e., drooling)			
	Swallow 90 ml of liquid (To be evaluated only on the safe swallow of 5 and 10 ml of liquid)	Nasal regurgitation			
		Oral transit			
		Laryngeal elevation			
		Cough			
		Post swallow voice			
Solid *	Eat 5 grams of rice flakes	Lip seal			
		Bolus preparation			
		Nasal regurgitation			
		Oral transit			
		Laryngeal elevation			
		Food residue in anterior sulcus			
		Food residue in lateral sulcus			
		Food residue spread throughout the oral cavity			
		Cough			
		Post swallow voice			
		Piecemeal deglutition			
Total					

*If the client is tracheostomized, solids/thick liquids/thin liquids should be mixed with beetroot juice/carrot juice and observe the above mentioned parameters.

TOTAL SCORE

SUBSCALE 4: TOLERANCE OF CONSISTENCIES

Oral phase tolerance of consistencies		
Consistencies	Tolerates	Remarks
Solids		
Thick liquids		
Thin liquids		
Pharyngeal phase tolerance of consistencies		
Solids		
Thick liquids		
Thin liquids		

Descriptive Diagnosis:

Recommendations:

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