



INSTRUCTION on how to use the GUGGING SWALLOWING SCREEN (GUSS)

(Michaela Trapl et al. 2007; Warnecke et al. 2013; M. Trapl et al. 2017)

Materials required for the indirect swallowing test (Fig.1):

- Cup
- Teaspoon
- Water (still mineral water or sterile water)
- Stethoscope

Materials required for the direct swallowing test (*only* if the indirect swallowing attempt was successful) (Fig.1):

- Syringe (20ml)
- Food Thickener
- One piece of bread (1,5 x 1,5cm)



Fig. 1 Materials for the GUSS

1) Preliminary Investigation / Indirect Swallowing Test:

VIGILANCE

- The patient must be sufficiently awake (minimum of 15 minutes)
- Place the patient in an upright sitting position
- Tick "Yes" on the GUSS sheet (= 1 point) if the above criteria apply

COUGHING and/or THROAT CLEARING

- Ask the patient to cough hard OR clear his throat
- Show the patient if necessary
- Only a cough OR throat clearing strong enough to (technically) transport a foreign body from the throat is scored with one point (= "Yes"). If the patient cannot cough or clear his throat for cognitive reasons, a point may be assigned to the relevant section "patients who do NOT have ACUTE stroke".



SWALLOWING SALIVA

- Swallowing successful
 - Ask the patient to swallow his own saliva.
 - If this is not possible, perform standardised oral hygiene and moisten the oral mucosa. If a swallow can be observed, this can be evaluated with 1 point. It is also possible to use saliva spray to moisten the oral mucosa.
 - If, for cognitive reasons, the patient is unable to swallow saliva upon verbal request, please observe whether there is a swallow. Alternatively, you may also dip a spoon into a cup of water and apply the wetted spoon into the mouth. If swallowing occurs, this is evaluated with 1 point.
 - If a patient coughs in the process of swallowing saliva, please rate this with 0 points ("swallowing not possible").

- Drooling:
 - Observe, whether the patient exhibits signs of drooling. Drooling is defined as saliva, food or fluid leaking out of the mouth unintentionally. The patient scores 0 points if there is drooling beyond the corner of the mouth and he does not sense it (Fig. 2).



Fig. 2 Salivadrooling

- Voice Change after the saliva swallow:
 - Ask the patient to say "Aah" or try to listen to the patients' voice during a short conversation.
 - If the patient has a gargly, moist voice or breathes as if mucus has accumulated in the pharynx or larynx area and has not been transported away, tick "Yes" (= 0 points).
 - If the patient has had a hoarse voice since the onset of the first stroke symptoms, then also choose "Yes" (= 0 points).
 - If it is not possible for the patient to vocalise, then use the stethoscope instead and listen for breath sounds in the neck area (Fig. 3). If you hear a gargling sound during breathing, please tick "Yes" and score 0 points.

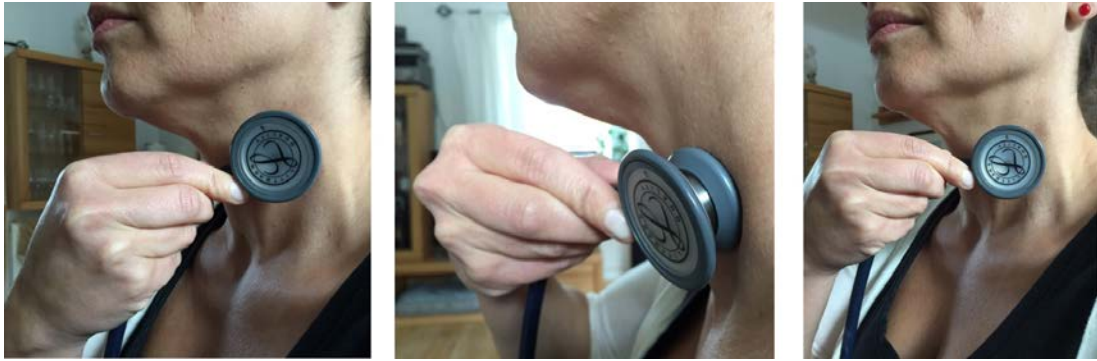


Fig. 3 "Cervical Auscultation" Listening to respiratory sounds

- Now add up all the points of the preliminary examination and write the number in the field "SUM" (Fig. 4)
- If the patient reaches 5 points, continue with the direct swallowing attempt
- If the patient has scored less than 5 points the examination must be stopped and the patient is given an NPO diet (=nothing per os). You can find all dietary recommendations on the back of the GUSS evaluation form.

1. Preliminary Investigation / Indirect Swallowing Test			
		YES	NO
VIGILANCE	The patient must be alert for at least <u>15 minutes</u>	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
COUGHING and/or THROAT CLEARING	Voluntary cough: The patient should cough or clear his/her throat twice	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
SWALLOWING SALIVA	Conduct oral hygiene if the mouth is very dry If the patient coughs during or after swallowing saliva please tick „No“	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
• Swallowing successful			
• Drooling	Permanent severe saliva drooling	0 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>
• Voice change after swallowing	Gurgling, wet hoarse voice since onset of stroke	0 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>
	SUM:	5 (5)	
		1 – 4 = Stop the test see GUSS-Evaluation 5 = Continue with part 2	

Fig. 4 GUSS-Screen "Preliminary Investigation" successful with 5 points



2) Direct Swallowing Test

Required materials:

- Cup
- Syringe (20ml)
- Thickener
- Teaspoon
- Pieces of bread (1.5 x 1.5 cm)
- Water (still mineral water or sterile water)

SWALLOW ATTEMPT „SEMISOLID“

- Mix approx. 50ml of water with a food thickener to achieve a pudding-like consistency (Fig. 5) according to IDDSI Level 3 guidelines. (<http://iddsi.org/wp-content/uploads/2017/07/German.pdf>) (Cichero et al. 2017).



Fig. 5 Thickening of water for the semisolid swallowing test

- Tell the patient he will receive a small amount of thickened water. Prepare him for the fact that this bolus will be tasteless and that he should swallow it as quickly as possible.
- Administer half a teaspoon of the thickened water to the patient (Fig. 6).



Fig. 6 Administration of a half teaspoon of thickened water



- Evaluate the risk of aspiration according to the 4 criteria listed on the left side of the protocol sheet (deglutition, coughing, drooling, voice change).
- Deglutition:
 - If the patient does not swallow, or if the bolus has to be removed orally, the patient receives 0 points ("Swallowing not possible") and the examination must be stopped.
 - The bolus should be swallowed within 2 seconds, as soon as it is placed onto the middle of the tongue. In case of a prolonged oral phase, "Swallowing delayed" (=1 point) is ticked and the examination must be stopped.
 - A successful swallow should be completed within 2 seconds, as soon as the bolus is removed from the spoon. If the patient manages to achieve this action during this period, he is permitted to continue with another teaspoon, even if the other 3 signs of aspiration (coughing, drooling, voice change) are inconspicuous.
 - The size of the boli for the subsequent teaspoons should increase. The first teaspoon should be half, the second a whole teaspoon, and the third a heaped teaspoon. It is up to the examiner whether he tests 3, 4 or 5 teaspoons, depending on how conclusive the examination is.
 - If all 3-5 teaspoons are inconspicuous, then this is marked with "Swallow successful" (= 2 points).
- Coughing:
 - If the patient coughs involuntarily (because of bolus delivery) before, during or after swallowing, the patient is evaluated with "Yes" (=0 points) and the examination is cancelled.
 - "Coughing up to 3 minutes later" means that at the end of the subtest "Semisolid" the examiner is advised to wait up to 3 minutes to determine whether coughing follows the swallows.
 - If the patient does not cough, then, even if the other 3 aspiration signs (deglutition, drooling, voice change) are inconspicuous, it is permissible to continue with another teaspoon.
 - If the patient does not cough after 3-5 teaspoons, "No" (=1 point) is marked.
- Drooling:
 - If food is drooling visibly out of the mouth, it is evaluated with "Yes" (=0 points).
 - If there is no drooling, then, if the other 3 signs of aspiration (deglutition, coughing, voice change) are inconspicuous, continue with another teaspoon.
 - If there is no drooling after 3-5 teaspoons, then you can rate it with "No" (= 1 point).
- Voice Change:
 - In order to be able to identify a change of voice after swallowing, the patient must be capable of giving voice (=phonating). Ask the patient to speak a long "ohhh" first. If the voice sounds gargly, husky or changed, as if saliva, mucus or a bolus has accumulated in the throat, a "yes" (=0 points) must be checked



and the examination must be stopped. If you are not sure if the voice has changed, let the patient speak a long "Ahhhhh".

- If the patient is unable to produce a voice, please use a stethoscope to monitor the breathing sounds (Fig. 3).
 - If a change of voice (or gurgled breathing) is audible, the examination must be stopped.
 - If the voice is the same as before the bolus swallow, then if the other 3 signs of aspiration (deglutition, drooling, coughing) are inconspicuous, it is permissible to continue with another teaspoon.
 - If the voice is inconspicuous even after 3-5 teaspoons, then score "No" (=1 point).
-
- Add up all the points of the sub-test "SEMISOLID" and write the number in the field "Sum" (fig. 7).
 - If the patient has reached 5 points, the subtest "LIQUID" may be continued.
 - If the patient has less than 5 points in the sub-test "SEMISOLID", the examination must be stopped. The points of the preliminary examination are added together with the points of the SEMISOLID subtest and are entered as a total in the bottom line of the evaluation sheet (SUM: Indirect Swallowing Test AND Direct Swallowing Test).
 - According to the dietary recommendations on the back of the GUSS (points 0-9) the patient receives nothing per os (NPO).
 - At a score of 9, after consultation with a speech therapist or a doctor, crushed medications mixed with homogeneous pureed textures may be administered.



2. Direct Swallowing Test (Material: Water, food thickener, teaspoon, cup, syringe, bread, biscuit)			
In the following order	SEMISOLID →	LIQUID →	SOLID
	½ teaspoon of thickened water (IDDSI: Level 3) If there are no symptoms apply 3-5 more teaspoons Stop the investigation if one of the 4 aspiration criteria is observed	Offer 3, 5, 10, 20 ml of water in a cup followed by 50 ml of water. (sequential swallows) Stop the investigation if one of the 4 aspiration criteria is observed	Offer a piece of bread without crust and/or a piece of biscuit (max. 1.5 x 1.5cm) Stop the investigation if one of the 4 aspiration criteria is observed
DEGLUTITION			
<ul style="list-style-type: none"> ▪ Swallowing not possible ▪ Swallowing delayed (semisolids, fluids > 2 sec. solids > 10 sec.) ▪ Swallowing successful 	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
COUGHING (involuntary) <i>(before, during and after swallowing - until 3 minutes later)</i>			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
DROOLING			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
VOICE CHANGE <i>(Listen to the voice before and after swallowing - Patient should say „Ohhh“)</i>			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
SUM:	5 (5)	(5)	(5)
	1 - 4 = Stop the test see GUSS-Evaluation 5 = Continue „Liquid“	1 - 4 = Stop the test see GUSS-Evaluation 5 = Continue „Solid“	
SUM: (Indirect Swallowing Test AND Direct Swallowing Test)			_____ (20)

Fig. 7 GUSS-Test "SEMISOLID" successful with 5 points



SWALLOW ATTEMPT „LIQUID“

- Fill a glass or cup with approx. 100 ml of water. Prepare a 20 ml syringe and a large-diameter cup.
- First, 3ml of water are drawn up with the syringe and poured into the cup.
- Offer the patient the cup and tell him that he will only receive a small amount of water and that he should try not to put his head backwards while drinking, but rather he should tilt the cup well so that he can consume the small amount (Fig. 8).



Fig. 8 Drinking 3ml of water from a cup

- Evaluate the risk of aspiration according to the 4 criteria listed on the left side of the protocol sheet (deglutition, coughing, drooling, voice change).
- Deglutition:
 - If the patient does not swallow, or if the bolus even has to be removed orally, the patient receives 0 points ("Swallowing not possible") and the examination must be stopped.
 - The water must be swallowed within 1-2 seconds after being placed in the mouth. In the case of a prolonged oral phase, "Swallowing delayed" (=1 point) is marked and the examination must be stopped.
 - If the patient can swallow the water bolus within 1-2 seconds, then, even if the other signs of aspiration (coughing, drooling, voice change) are inconspicuous, continue with 5ml of water administered in the cup (Fig. 9). If these 5 ml prove inconspicuous again, continue with 10ml, 20ml and finally 50ml (Fig. 10). In case of any changes or abnormalities concerning the 4 aspiration signs, the examination must be stopped immediately.
 - If all liquid swallows are normal then this is marked with "Swallowing successful" (= 2 points).

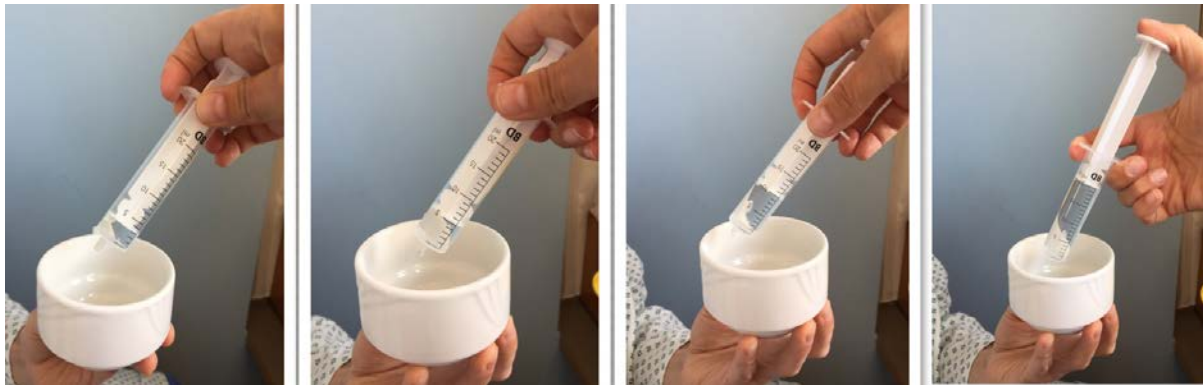


Fig. 9 Water Swallowing Test administered with increasing amounts of water (3,5,10,20ml)

- Coughing:
 - If the patient coughs involuntarily (due to the swallowing of water) before, during or after swallowing, the examination is evaluated with "Yes" (=0 points) and the examination has to be interrupted or suspended.
 - "Coughing up to 3 minutes later" does not mean to wait 3 minutes after each swallow, but at the end of the subtest "Liquid" the examiner should wait for a period of up to 3 minutes to determine whether coughing follows.
 - If the patient does not cough, then, even if the other 3 aspiration signs (deglutition, drooling, voice change) are inconspicuous, it is permissible to continue with 5ml (10ml, 20ml and 50ml).
 - If the patient does not even cough after 50ml, "No" (=1 point) is ticked.

- Drooling:
 - If there are any signs of visible drooling, evaluate with "Yes" (=0 points).
 - If there is no drooling, then, if the other 3 signs of aspiration (deglutition, coughing, voice change) are inconspicuous, continue with 5ml (10ml, 20ml und 50ml).
 - If there is no drooling, even after 50ml, then you can score "No" (= 1 point).

- Voice change:
 - In order to be able to identify a change of voice after liquid swallowing, the patient must be capable of giving a voice (=phonating). Ask the patient to speak a long "ohhh" first. If the voice sounds gargly husky or changed, as if saliva, mucus or bolus has accumulated in the throat, "yes" (=0 points) must be marked and the examination must be stopped. If you are unsure if there has been a change of voice let the patient speak a long "Ahhhhh".
 - If the patient cannot produce a voice, please listen to the respiratory sounds using a stethoscope (see Fig. 3).
 - If a change of voice (or gurgled breathing) is audible, the examination must be stopped.
 - If the voice appears the same as before the swallow and the other 3 signs of aspiration (deglutition, drooling, coughing) are inconspicuous, it is safe to continue with 5ml (10ml, 20ml und 50ml).
 - If there is no voice change even after 50ml, then you can score "No" (= 1 point).



Fig. 10 Drinking 50ml from a cup or a glas

- Add up all the points of the "LIQUID" sub-test and write the number in the "Sum" field (Fig. 11).
- If the patient scores 5 points or more, the subtest "SOLID" may be continued.
- If the patient scores **less than 5 points** in the sub-test "LIQUID", then the examination must be stopped. The points of the preliminary examination are summed up with the points of the subtest SEMISOLID and LIQUID and are entered as a total sum in the bottom line (SUM: Indirect Swallowing Test AND Direct Swallowing Test).
- Dietary recommendations corresponding to the total number of points achieved are suggested on the second page/back of the GUSS. Patients with less than 5 points in the sub-test "Liquid" generally have a total score of 10-14 points and are classified with moderate dysphagia. It is recommended that these patients consume a homogenously pureed diet and thicken liquids. There are currently no evidence-based recommendations on the degree of thickening required, so the first step is to start with an average concentration (IDDSI 3-4) and evaluate whether it is safe for the patient.
- The 4 criteria for the evaluation of aspiration should always be remembered: Coughing, drooling, swallowing, voice changing. If the patient exhibits any signs of abnormality whilst eating, then a new swallowing attempt must be initiated and changes have to be made to prevent the patient suffering from aspiration.



2. Direct Swallowing Test (Material: Water, food thickener, teaspoon, cup, syringe, bread, biscuit)			
In the following order	SEMISOLID →	LIQUID →	SOLID
	½ teaspoon of thickened water (IDDSI: Level 3) If there are no symptoms apply 3-5 more teaspoons Stop the investigation if one of the 4 aspiration criteria is observed	Offer 3, 5, 10, 20 ml of water in a cup followed by 50 ml of water. (sequential swallows) Stop the investigation if one of the 4 aspiration criteria is observed	Offer a piece of bread without crust and/or a piece of biscuit (max. 1.5 x 1.5cm) Stop the investigation if one of the 4 aspiration criteria is observed
DEGLUTITION			
<ul style="list-style-type: none"> ▪ Swallowing not possible ▪ Swallowing delayed (semisolids, fluids > 2 sec. solids > 10 sec.) ▪ Swallowing successful 	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
COUGHING (involuntary) <i>(before, during and after swallowing - until 3 minutes later)</i>			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
DROOLING			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
VOICE CHANGE <i>(Listen to the voice before and after swallowing - Patient should say „Ohhh“)</i>			
<ul style="list-style-type: none"> ▪ Yes ▪ No 	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/> 1 <input type="checkbox"/>
SUM:	5 (5)	5 (5)	(5)
	1 – 4 = Stop the test see GUSS-Evaluation 5 = Continue „Liquid“	1 – 4 = Stop the test see GUSS-Evaluation 5 = Continue „Solid“	
SUM: (Indirect Swallowing Test AND Direct Swallowing Test)			_____ (20)

Fig. 11 GUSS-Test "LIQUID" successful with 5 points

SWALLOW ATTEMPT „SOLID“

- For this swallowing test, offer the patient a piece of dry bread in the size of 1.5 x 1.5 cm (Fig. 12)
- Please also prepare water for drinking.
- Before giving the piece of bread to the patient, please determine his dental status (is there a prosthesis in the mouth, and does it fit well? Is there a denture at all? Is the patient accustomed to eating without a prosthesis? Does he have it at home? Has it been lost? Is a dentist visit imminent? Does the patient have toothache, tooth gaps...? ...).
- If, due to your assessment of the patient's dental status and history or current diagnosis, you consider it inappropriate to give the patient something solid, please cancel the examination. Since the patient has already reached at least 15 points, he can be oralized with pureed food and normal (unthickened) liquids.
- Once you have established that the patient is able to chew the piece of bread, start the examination of the final sub-test.



Fig. 12 Swallow attempt with bread (1.5x1.5cm) Subtest "SOLID"

- Evaluate the risk of aspiration according to the 4 criteria listed on the left side of the protocol sheet (deglutition, coughing, drooling, voice change).
- Deglutition:
 - If the patient does not swallow, or if the bolus has to be removed from the patient's mouth, he receives 0 points ("Swallowing not possible") and the examination must be stopped.
 - The *bread swallow* must be chewed and swallowed within 23 seconds. In case of a prolonged oral phase, the box "delayed act of swallowing" (=1 point) should be ticked and the examination is stopped.
 - As soon as the patient has swallowed, inspect the oral cavity. It is normal for elderly people to have a few residues in their oral cavity. Therefore, offer a few sips of water and evaluate whether these swallows can also be conducted without signs of aspiration.
 - If the patient succeeds in swallowing bread within the period of 23 seconds, another test bolus may be administered if the other 3 aspiration signs (cough, drooling, voice change) are also inconspicuous. The examiner may decide how many bread trials are needed. The GUSS only provides for one test sip. However, it is strongly recommended to observe the consumption of at least one additional (slightly larger) bolus, because this mimics the reality of eating. By providing water after the solid test, you can finally identify the risk of aspiration with mixed consistencies.
 - If the bread swallows are without aspiration signs, this is marked with "Swallowing successfully" (= 2 points).
- Coughing:
 - If the patient coughs involuntarily (due to swallowing of bread) before, during or after swallowing, the examination is evaluated with "Yes" (=0 points) and the examination must be interrupted.
 - "Coughing until 3 minutes later" means that at the end of the subtest "Solid" the examiner is advised to wait up to 3 minutes to determine whether coughing follows the swallows.



- If the patient does not cough, the next piece of bread may be administered to the patient, even if the other 3 aspiration signs (deglutition, drooling, voice change) are inconspicuous
 - If the patient does not cough after the last (bread) solid bolus, "No" (=1 point) is ticked.
- Drooling:
 - If the bread or a piece of bread is drooling visibly out of the mouth, it is evaluated with "Yes" (=0 points).
 - If there is no drooling, and the other 3 signs of aspiration (deglutition, coughing, voice change) are inconspicuous, continue with another piece of bread.
 - If there is no drooling even after the last (test) bolus, then please score "No" (= 1 point)
- Voice change:
 - In order to be able to identify a change of voice after solid swallowing, the patient must be capable of vocalising. Ask the patient to speak a long "ohhh" at first. If the voice sounds gargly, husky or altered, as if saliva, mucus or a bolus has accumulated in the throat, a "yes" (=0 points) should be checked and the examination must be stopped. If you are not sure if the voice is altered, instruct the patient to speak a long "Ahhhhh".
 - If the patient cannot produce a voice, please listen to the respiratory sounds using a stethoscope (see Fig. 3).
 - If a change of voice (or gurgled breathing) is audible, the examination must be stopped.
 - If the voice remains unaltered after the solid bolus swallow and the other 3 signs of aspiration (deglutition, drooling, coughing) are inconspicuous, continue with another solid bolus.
 - If there is no voice change after the last swallow of solid food (bread), you should score "No" (= 1 point).
- Add all the points of the "SOLID" sub-test together and write the number in the "Sum" field (Fig. 13).
- If the patient has reached at least 5 points, the GUSS is successfully completed. Add up all the points (maximum of 20) and enter this into the total sum field at the bottom of the form (fig. 13).
- If the patient has less than 5 points in the sub-test "SOLID", the examination must be interrupted. The points of the preliminary examination are added up with the total points of the SEMISOLID, LIQUID and SOLID subtests and are put in the bottom line (SUM: Indirect Swallowing Test AND Direct Swallowing Test).



- According to the GUSS results (total number of points), dietary recommendations are suggested at the back of the GUSS evaluation. Patients who achieved less than 5 points in the sub-test "SOLID" usually have a total score of 15-19 points and are classified as having a mild swallowing disorder. A soft diet without mixed consistencies is recommended. Liquids may still be thickened if the patient is at risk of aspiration due to his or her general condition or neuropsychological disorders. Water may be administered unthickened according to the Frazier protocol (Gillman, Winkler, and Taylor 2017; Gillman, Winkler, and Taylor 2016).
- The 4 criteria for evaluating aspiration should always be kept in mind: Coughing, drooling, swallowing, voice change. If the patient shows any abnormalities during the screening, a new attempt to swallow should be conducted.
- The GUSS can be repeated as often as needed, but always before changing to a different type of food.



Patient's label

GUSS

(Gugging Swallowing Screen)

Date: _____

Time: _____

Investigator: _____

1. Preliminary Investigation / Indirect Swallowing Test

		YES	NO
VIGILANCE	The patient must be alert for at least <u>15 minutes</u>	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
COUGHING and/or THROAT CLEARING	Voluntary cough: The patient should cough or clear his/her throat twice	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
SWALLOWING SALIVA	Conduct oral hygiene if the mouth is very dry if the patient coughs during or after swallowing saliva please tick „No“	1 <input checked="" type="checkbox"/>	0 <input type="checkbox"/>
• Swallowing successful			
• Drooling	Permanent severe saliva drooling	0 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>
• Voice change after swallowing	Gurgling, wet hoarse voice since onset of stroke	0 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>
	SUM:		5 (5)
		1 - 4 = Stop the test see GUSS-Evaluation 5 = Continue with part 2	

2. Direct Swallowing Test (Material: Water, food thickener, teaspoon, cup, syringe, bread, biscuit)

In the following order	SEMISOLID →	LIQUID →	SOLID
	½ teaspoon of thickened water (IDDSI: Level 3) If there are no symptoms apply 3-5 more teaspoons Stop the investigation if one of the 4 aspiration criteria is observed	Offer 3, 5, 10, 20 ml of water in a cup followed by 50 ml of water. (sequential swallows) Stop the investigation if one of the 4 aspiration criteria is observed	Offer a piece of bread without crust and/or a piece of biscuit (max. 1.5 x 1.5cm) Stop the investigation if one of the 4 aspiration criteria is observed
DEGLUTITION			
▪ Swallowing not possible	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>
▪ Swallowing delayed (semisolids, fluids > 2 sec. solids > 10 sec.)	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	1 <input type="checkbox"/>
▪ Swallowing successful	2 <input checked="" type="checkbox"/>	2 <input checked="" type="checkbox"/>	2 <input checked="" type="checkbox"/>
COUGHING (involuntary) (before, during and after swallowing - until 3 minutes later)			
▪ Yes	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>
▪ No	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>
DROOLING			
▪ Yes	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>
▪ No	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>
VOICE CHANGE (Listen to the voice before and after swallowing - Patient should say „Dhgh“)			
▪ Yes	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>	0 <input checked="" type="checkbox"/>
▪ No	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>
	SUM:	5 (5)	5 (5)
		1 - 4 = Stop the test see GUSS-Evaluation 5 = Continue „Liquid“	1 - 4 = Stop the test see GUSS-Evaluation 5 = Continue „Solid“
SUM: (Indirect Swallowing Test AND Direct Swallowing Test)		20 (20)	

The Gugging Swallowing Screen. Stroke. 2007;38:2948 Michaela Trapl, SLT, MSc; Paul Enderle, MD, MSc; Monika Nowotny, MD; Yvonne Teuschl, PhD; Karl Matz, MD; Alexandra Dachenhausen; PhD Michael Brainin, MD

Fig. 13 GUSS-Test: Successful in all subtests: Total score: 20 points



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List of abbreviations:

GUSS	G ugging S wallowing S creen
Drooling	Flow of saliva, food or fluids out of the mouth
Bolus	The amount of food or fluids you ingest in your mouth



Bibliography:

- Cichero, Julie A.Y., Peter Lam, Catriona M. Steele, Ben Hanson, Jianshe Chen, Roberto O. Dantas, Janice Duivesteyn, et al. 2017. "Development of International Terminology and Definitions for Texture-Modified Foods and Thickened Fluids Used in Dysphagia Management: The IDDSI Framework." *Dysphagia* 32 (2). Springer US: 293–314. doi:10.1007/s00455-016-9758-y.
- Gillman, Anna, Renata Winkler, and Nicholas F. Taylor. 2016. "Implementing the Free Water Protocol Does Not Result in Aspiration Pneumonia in Carefully Selected Patients with Dysphagia: A Systematic Review." *Dysphagia*. Springer US, 1–17. doi:10.1007/s00455-016-9761-3.
- Gillman, Anna et al. 2017. "Implementing the Free Water Protocol Does Not Result in Aspiration Pneumonia in Carefully Selected Patients with Dysphagia: A Systematic Review." *Dysphagia* 32 (3): 345–61. doi:10.1007/s00455-016-9761-3.
- Trapl, M., Y. Teuschl, K. Matz, A. Dachenhausen, and M. Brainin. 2017. "Overestimating the Risk of Aspiration in Acute Stroke." *European Journal of Neurology* 24 (6): e34–e34. doi:10.1111/ene.13298.
- Trapl, Michaela, Paul Enderle, Monika Nowotny, Yvonne Teuschl, Karl Matz, Alexandra Dachenhausen, and Michael Brainin. 2007. "Dysphagia Bedside Screening for Acute-Stroke Patients: The Gugging Swallowing Screen." *Stroke* 38 (11): 2948–52. doi:10.1161/STROKEAHA.107.483933.
- Warnecke, Tobias, Sonja Suntrup, Inga K. Teismann, Christina Hamacher, Stephan Oelenberg, and Rainer Dziewas. 2013. "Standardized Endoscopic Swallowing Evaluation for Tracheostomy Decannulation in Critically Ill Neurologic Patients." *Critical Care Medicine* 41 (7): 1728–32. doi:10.1097/CCM.0b013e31828a4626.