Instructions of the Gugging Swallowing Screen for the Intensive Care Unit (GUSS-ICU)

(Claudia Troll et al. 2023)

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

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

Additional utensils required for the direct swallowing test, if the indirect swallowing test was successful (Fig.1):

- 20ml syringe
- Thickener
- Piece of bread (1.5 x 1.5cm)

Fig. 1 Utensils for the GUSS-ICU

1. **Preliminary examination/indirect swallowing test**
   In the pre-test, six items are tested, which are marked with a `yes` or `no` and a score of 0 or 1 points, respectively. The aim is to achieve all 6 points to record a successful indirect swallow attempt. The items of the preliminary examination are explained in detail below.

   Richmond Agitation Sedation Scale (RASS) (see Table 1)
   - The patient should have a RASS of 0 to +2
   - Put the patient in an upright sitting position
   - Tick `yes` (=1 point) if this point is given

   Stridor present
   - Observe and listen if the patient has inspiratory or expiratory stridor
   - Tick “no” (=1 point) if the patient does not show stridor

   Coughing and/or throat clearing effectively possible
   - Ask the patient to cough vigorously OR clear his/her throat
   - Demonstrate it if necessary
   - Only a forceful cough or a forceful throat clearing is assessed with `yes` (=1 point). To ensure success, either of the two tasks must be performed skillfully, leaving the investigator confident that the patient can remove any foreign objects on their own

   Saliva swallowing possible
   - Ask the patient to swallow his/her saliva
   - If this is unsuccessful, perform standardised oral hygiene and moisten the oral mucosa. If a swallow is observable in the process, you can score it. Using a saliva spray to moisten the oral mucosa is also possible
   - If the patient cannot initiate the saliva swallow on verbal prompting for cognitive reasons, continue to observe and note if a swallow occurs spontaneously within the next 2 minutes. Alternatively, one may dip a spoon into a cup of water and administer the wetted spoon. If swallowing occurs, this may also be awarded one point
   - If a patient chokes while swallowing saliva, score this with 0 points (“Swallowing not possible”)

Drooling

- Observe if the patient has salivary drooling. Drooling means saliva, food or fluid leaking from the mouth. Score 0 points, if there is an apparent leakage of saliva beyond the corner of the mouth and the patient does not feel it (Fig.2)

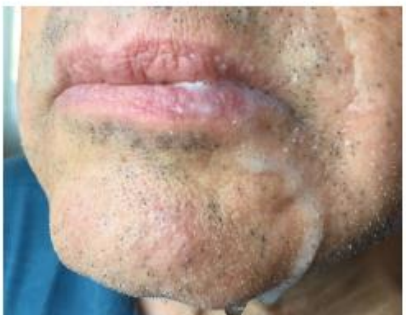

Fig. 2 Saliva drooling

Voice change after the saliva swallow:

- Ask the patient to speak an “Ah” or try to listen to the voice in the conversation
- If the patient has a gurgling, moist voice or breathing (as if mucus has accumulated in the throat area/vocal fold area and is not being carried away), then indicate “yes” (=0 points)
- If the patient is unable to produce a voice (phonation) for various reasons, listen to the breathing in the throat area with the stethoscope (Fig.3). If a gurgling breathing sound is heard, then again indicate “yes” (=0 points)

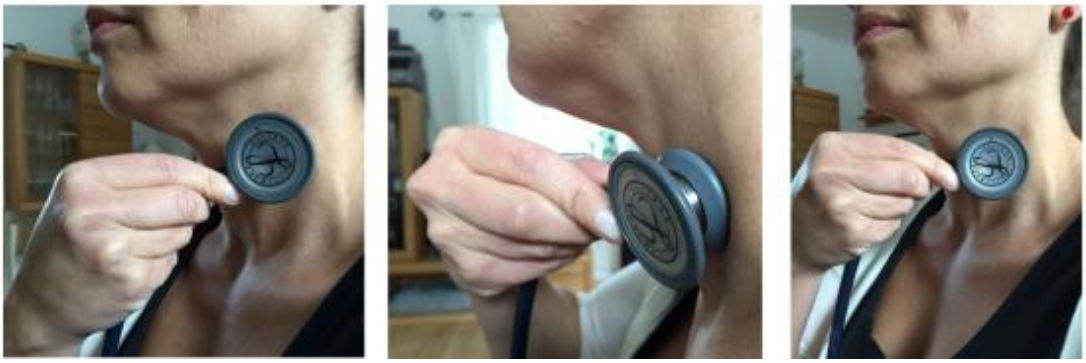

Fig. 3 “Cervical auscultation” Listening to breathing sounds

Add up all the points from the preliminary examination and write the number in the “SUM” field (Fig.4)
If the patient has less than 6 points, the examination must be stopped, and the patient is given nothing by mouth (NPO), according to the dietary recommendations on the back of the GUSS-ICU

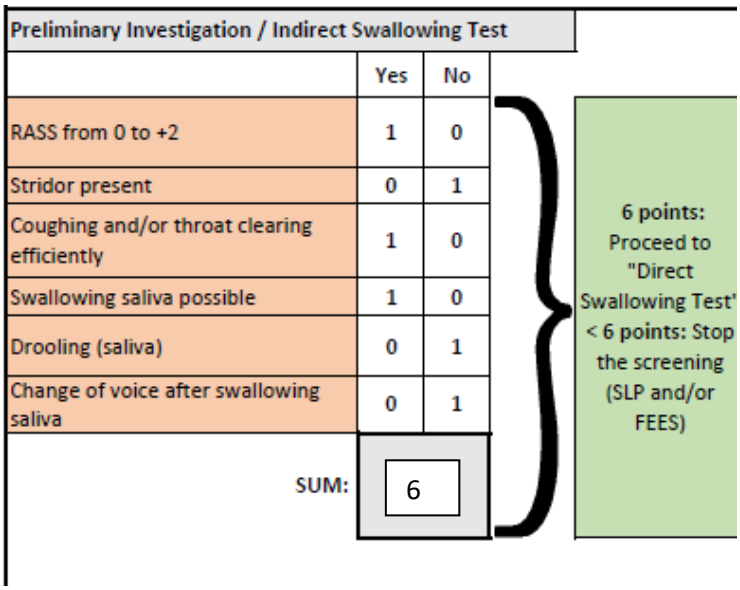

Fig. 4 GUSS-ICU test «Pre-examination» successful with 6 points

	Target RASS Value	RASS Description
+4	Combative	Combative, violent, immediate danger to staff
+3	Very Agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent non-purposeful movement, fights ventilator
+1	Restless	Anxious, apprehensive but movements are not aggressive or vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert, but has sustained awakening to voice (eye opening & contact **greater** than 10 seconds)
-2	Light Sedation	Briefly awakens to voice (eye opening & contact **less** than 10 seconds)
-3	Moderate Sedation	Movements or eye opening to voice (but **NO** eye contact)
-4	Deep Sedation	No response to voice, but has movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

Table 1: Richmond Agitation Sedation Scale (RASS) for clinical assessment of alertness and sedation. The scale can be used in medically sedated and non-sedated patients (Sessler et al. 2002.)

2. Direct swallowing test

Utensils required:

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

2.1 Swallowing test «Semisolid»

- Mix 50ml of water and a thickener to a honey-like consistency (Fig.5) according to IDDSI guideline level 3 (https://iddsi.org/wp-content/uploads/2017/07/German.pdf) (Chichero et al. 2017)

Abb. 5. Thickening water for the semisolid swallow test

- First, administer one teaspoon of thickened water (Fig.6) to the patient
- Tell the patient that he/she will be given a small amount of thickened water Prepare him/her that this, like water, will have no taste and that he/she should swallow this small amount as he/she can
- Assess the risk of aspiration according to the four criteria listed in the footnote of the protocol sheet under “Problems with swallowing”: Prolonged oral phase, coughing, drooling, and voice change. A detailed explanation of the assessment of the aspiration signs can be found under the point “Aspiration sign assessment”
- This procedure should be repeated 3-5 times. It is up to the examiner whether to test 3,4 or 5 teaspoons, depending on how conclusive the examination is.
- If all 3-5 teaspoons are inconspicuous, this is assessed as “inconspicuous” (=1 point)
- If there is even one abnormality in one of the four aspiration signs, the examination is terminated, and no further teaspoon is administered (=0 points)

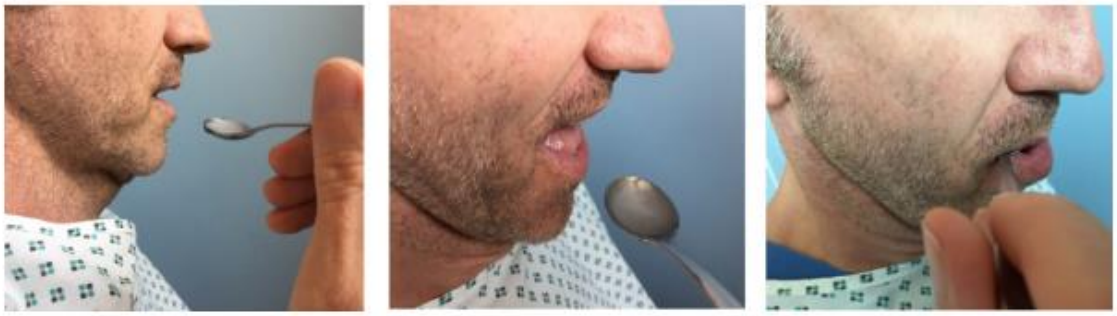

Fig. 6 Application of half a teaspoon of thickened water

Assessment of aspiration signs:

- Swallowing act (oral phase):
  - If the patient does not swallow or if the bolus has to be sucked out orally, this is considered “conspicuous”, and the examination must be stopped
  - Once placed in the mouth and on the tongue, the semisolid must be swallowed within 10 seconds. If the oral phase lasts longer, the swallowing act is “conspicuous”, and the examination must be stopped
  - A successful swallow is completed within 10 seconds after the bolus is removed from the spoon. If the patient manages to do this and the other three aspiration signs (coughing, drooling, voice change) are also inconspicuous, the patient may continue with another teaspoonful

- Cough:
  - If the patient coughs involuntarily (due to the bolus administration) before, during or after the semisolid swallow, it is assessed as “conspicuous”, and the examination is stopped
  - If the patient does not cough and if the other three aspiration signs (prolonged oral phase, drooling, voice change are inconspicuous, proceed with another teaspoonful

- Drooling:
  - If the food visibly runs out of the mouth again, this is called a “rated” conspicuous
  - If there is no drooling and if the other three aspiration signs (prolonged oral phase, cough, voice change) are also inconspicuous, continue with another teaspoonful

- Change of voice:
  - In order to hear a voice change after swallowing semisolids, the patient must be able to produce a voice (=phonate). First, ask the patient to say a long ”Ohhhhh”. If the voice sounds gargled, occupied or altered, as if saliva, mucus or bolus has accumulated in the throat, it must be assessed as “conspicuous”, and the examination must be stopped. If you are unsure whether the voice is unclean, let the patient speak a long “Ahhhh”
  - If the patient cannot produce a voice, please listen again to the breathing sounds using a stethoscope (Fig.3)
  - If a change in voice (or gurgling breathing) is audible, the examination must be stopped
  - If the voice remains unchanged after the bolus swallow, and if the other three aspiration signs (prolonged oral phase, drooling, coughing) are also inconspicuous, continue with another teaspoonful

Scoring:

- If the patient reached 1 point, indicates no observable swallowing permitting the continuation of the “liquids” subtest.
- If the patient reached 0 point, the examination must be stopped completely.
- Record total points achieved in the “SUM” section.
- Per the GUSS-ICU`s dietary guidelines (points 0-6), the patient should not consume anything orally (NPO).
- A Patient with a score of 7 can safely consume soft or smooth liquids that are either pureed or thickened (IDDSI 3-4 for food and IDDSI 2-3 for liquids).

	Direct Swallowing Test (4 subtests)		
		Pass	Fail
6 points: Proceed to "Direct Swallowing Test" < 6 points: Stop the screening (SLP and/or FEES)	1. Semisolid: Give 3-5 tsp. of thickened water (IDDSI 3) *	1	0
	2. Liquids: Give 3, 5, 10, 20, 50 ml of water (IDDSI 0) *	1	0
	3. Solids: Give a piece of bread (1.5 x 1.5cm) *	1	0
	4. Liquids & Solids: Give a piece of bread (1.5 x 1.5cm) and a sip of water after half of the chewing time *	1	0
	SUM:		
	TOTAL SUM:		

Fig.7 GUSS-ICU test «semisolid” successful with 1 point

2.2 Swallowing test «Liquids»

- Fill a glass or cup with approx. 100ml of water. Prepare a 20ml syringe and a large-diameter cup
- First, 3ml of water is drawn up with the syringe and injected into the cup
- Offer the patient the cup to drink. Tell them that he/she will only get a small amount of water and that he/she should try not to tip the head back while drinking but instead tilt the cup well to drink (Fig.8)

Fig. 8: Drinking 3ml of water from the cup

- Assess the risk of aspiration again according to the four criteria listed in the footnote of the protocol sheet under “Problems with swallowing”: Prolonged oral phase, coughing, drooling, and voice change. A detailed explanation of the assessment of aspiration signs can be found under the following point “Assessment of aspiration signs”
- If there are no signs of aspiration, the fluids are administered in the cup in increasing volumes of 3ml, 5ml, 10ml, and 20ml (Fig.9). Finally, 50ml is offered in a glass or cup (Fig.10). As soon as there is a sign of aspiration, the examination is stopped

Assessment aspiration signs

- Swallowing act (oral phase):
    - If the patient does not swallow or if the bolus has to be sucked out orally again, this is “conspicuous”, and the examination is stopped
    - Once placed in the mouth and on the tongue, the liquid must be swallowed within 1-2 seconds. If the oral phase lasts longer, the swallowing act is “conspicuous”, and the examination must be stopped
    - If the patient can swallow the liquid within 1-2 seconds and if the other signs of aspiration (coughing, drooling, voice change) are also inconspicuous, continue with 5ml of liquid administered in a cup (Fig.9). If there is any change or abnormality in the four aspiration signs, stop the examination

Fig. 9 Water test in increasing volume (3, 5, 10, 20ml)

- Cough:
  - If the patient coughs involuntarily (due to the bolus administration) before, during or after the liquid swallow, this is assessed as “conspicuous”, and the examination is stopped.
  - If the patient does not cough, and the other signs of aspiration (prolonged oral phase, drooling, change of voice) are also inconspicuous, continue with 5ml (10ml, 20ml and 50ml)

- Drooling:
  - If the water visibly runs out of the mouth again, this is called a “rated” conspicuous
  - If there is no drooling, if the other three aspiration signs (prolonged oral phase, cough, change in voice) are also inconspicuous, 5ml (10ml, 20ml and 50ml) may be continued

- Change of voice:
  - To hear a voice change after the liquid swallow, the patient must be able to produce voice (=phonate). First, ask the patient to say a long “Ohhhhh”. If the voice sounds gargled, occupied or altered, as if saliva, mucus or bolus has accumulated in the throat, this is considered “conspicuous”, and the examination must be stopped. If you are unsure whether the voice is unclean, have the patient utter a long “Ahhhh”
  - If the patient cannot produce a voice, please listen again to the breathing sounds using a stethoscope (Fig.3)
  - If a change in the voice (or gurgling breathing) is audible, the examination must be stopped
  - If the voice remains unchanged after the water swallow and the other three aspiration signs (prolonged oral phase, drooling, coughing) are also inconspicuous, proceed with 5ml (10ml, 20ml and 50 ml)

Fig. 10 Drinking 50ml from a cup or glass

Scoring:

- If the patient reached 1 point, indicates no observable swallowing permitting the continuation of the “solids” subtest (Fig.11)
- If the patient reached 0 point, the examination must be stopped completely.
- Record total points achieved in the “SUM” section.
- Per the GUSS-ICU`s dietary guidelines (points 7), the patient can safely consume soft or smooth liquids that are either pureed or thickened (IDSSI 3-4 for food and IDDSI 2-3 for liquids)
- Per the GUSS-ICU`s dietary guidelines (points 8), the patient can safely consume semisolid passed fluids passed, solids failed (IDDSI 5 or 6 for food and IDDSI 0 for liquids)

	Direct Swallowing Test (4 subtests)		
		Pass	Fail
6 points: Proceed to "Direct Swallowing Test" < 6 points: Stop the screening (SLP and/or FEES)	1. Semisolid: Give 3-5 tsp. of thickened water (IDDSI 3) *	1	0
	2. Liquids: Give 3, 5, 10, 20, 50 ml of water (IDDSI 0) *	1	0
	3. Solids: Give a piece of bread (1.5 x 1.5cm) *	1	0
	4. Liquids & Solids: Give a piece of bread (1.5 x 1.5cm) and a sip of water after half of the chewing time *	1	0
	SUM:		
	TOTAL SUM:		

Fig. 11 GUSS-ICU test “Liquids” successful with 1 point

2.3 Swallowing test «Solids»

- For this swallowing test, offer the patient a piece of bread measuring 1.5cm x 1.5cm (Fig.12)
- Also have water ready to drink afterwards
- Before administering the piece of bread cube, please check the patient's dental status (is the denture in the mouth and does it fit well? Are there any dentures at all? Is the patient used to eating without dentures? Does the patient have a toothache, gaps between teeth, etc?)
- If you cannot justify giving the patient something solid based on your observation of the patient's dental status and history or current diagnosis, then stop the examination. However, since the patient has already reached at least 8 points, he/she can be given semisolid food (IDDSI 3+4) and unthickened liquid
- Once you have ensured that chewing is possible, start the examination of the subtest

Fig. 12 Swallowing test with bread (1.5x1.5) "SOLIDS" subtest

- Assess the risk of aspiration again according to the four criteria listed in the footnote of the protocol sheet under "Problems with swallowing": Prolonged oral phase, coughing, drooling, and voice change. A detailed explanation of the assessment of aspiration signs can be found under the following point "Assessment of aspiration signs"

Assessment aspiration signs

- Swallowing act (oral phase):
  - If the patient does not swallow, or if the bolus has to be sucked out or wiped out orally, this is "conspicuous", and the examination must be stopped

  - The bread swallow must be processed and swallowed within 23 seconds. A prolonged oral phase is also assessed as “conspicuous”, and the examination must be terminated
  - If the patient has swallowed, please check the mouth. It is normal for older people to have some bread residue (residues) in their mouths. Therefore, offer a few sips to drink and check whether this additional task is also feasible without aspirations signs
  - If the patient manages to swallow the bread within 23 seconds, another test swallow may be undertaken if the other three aspiration signs (coughing, drooling, voice change) are also inconspicuous. It is up to the examiner to decide how many bread swallows to take. Only one test swallow is planned in the GUSS-ICU. However, it is recommended that at least a second (somewhat larger) bolus is tested, as this also corresponds to the reality of food intake. Through “post-drinking”, one can also recognise the risk of aspiration with mixed consistencies
- Cough:
  - If the patient coughs involuntarily (due to bolus administration) before, during or after swallowing the solids this is assessed as “conspicuous”, and the examination is discontinued
  - «Coughing up to 3 minutes later» does not mean waiting 3 minutes after each swallow, but waiting a period of up to 3 minutes at the end of the subtest to see if there is a post-cough
  - three aspiration signs (prolonged oral phase, drooling, change in voice) are also inconspicuous

- Drooling:
  - If the food visibly runs out of the mouth again, this is assessed as “conspicuous”
  - If there is no drooling and the other three aspiration signs (prolonged oral phase, cough, voice change) are also inconspicuous, you may continue with another (slightly larger) piece of bread

- Change of voice:
  - In order to hear a voice change after swallowing bread, the patient must be able to produce voice (=phonate). First, ask the patient to say a long “Ohhhh”. If the voice sounds gargled, occupied or altered, as if saliva, mucus or bolus has accumulated in the throat, it must be assessed as “conspicuous”, and the examination must be stopped. If you are unsure whether the voice is unclean, have the patient utter a long “Ahhhh”
  - If the patient cannot give a voice, please listen again to the breathing sounds using a stethoscope (Fig.3)
  - If a change in voice (or gurgling breathing) is audible, the examination must be stopped
  - If the voice remains unchanged after the bolus swallow, proceed with another test swallow, if the other three aspiration signs (prolonged oral phase, drooling, coughing) are also inconspicuous

Scoring:

- If the patient reached 1 point, indicates no observable swallowing permitting the continuation of the “liquids and solids” subtest (Fig.12)
- If the patient reached 0 point, the examination must be stopped completely.
- Record total points achieved in the “SUM” section.
- Per the GUSS-ICU`s dietary guidelines (points 8), the patient can safely consume semisolid passed fluids passed, solids failed (IDDSI 5 or 6 for food and IDDSI 0 for liquids)
- Per the GUSS-ICU`s dietary guidelines (points 9), the patient can safely consume semisolids passed fluids passed, solids passed, mixed textures failed (IDDSI 6 or 7 for food and IDDSI 0 for liquids)

	Direct Swallowing Test (4 subtests)		
		Pass	Fail
6 points: Proceed to "Direct Swallowing Test" < 6 points: Stop the screening (SLP and/or FEES)	1. Semisolid: Give 3-5 tsp. of thickened water (IDDSI 3) *	1	0
	2. Liquids: Give 3, 5, 10, 20, 50 ml of water (IDDSI 0) *	1	0
	3. Solids: Give a piece of bread (1.5 x 1.5cm) *	1	0
	4. Liquids & Solids: Give a piece of bread (1.5 x 1.5cm) and a sip of water after half of the chewing time *	1	0
	SUM:		
	TOTAL SUM:		

Fig. 12 GUSS-ICU test “Solids” successful with 1 point

2.4 Swallowing test «Liquids & Solids»

- For this swallowing test, offer the patient a piece of bread measuring 1,5 x 1.5 cm (Fig.12) and a glass of water
- The patient should drink a sip of water after partly chewing the bread
- Once you have ensured that chewing is possible, examine the last subtest
- Assess the risk of aspiration again according to the four criteria listed in the footnote of the protocol sheet under “Problems with swallowing”: Prolonged oral phase, coughing, drooling, and voice change. A detailed explanation of the assessment of aspiration signs can be found under the following point “Assessment of aspiration signs”

Assessment aspiration sign

- Swallowing act (oral phase):
    - If the patient does not swallow, or if the bolus has to be aspirated, this is “conspicuous” and the examination is stopped
    - The administered mixed consistency (a piece of bread and a sip of water after partly chewing) must be processed and swallowed within 23 seconds. If the oral phase lasts longer, this is assessed as “conspicuous”, and the examination must be stopped
    - If the patient has swallowed, please check the mouth. It is normal for older people to have some bread residue (residue) in their mouth. Therefore, offer a few sips to drink and check with this additional task whether this is also feasible without aspiration signs
    - If the patient manages to swallow the bread with the water within 23 seconds, another test swallow may be undertaken if the other three aspiration signs (cough, drooling, voice change) are also inconspicuous. The examiner may decide how many sips of water are taken with the bread. In the GUSS ICU, only one test swallow is planned. However, it is recommended that at least a second (somewhat larger) bolus be taken, as this also corresponds to the reality of food intake

- Cough:
    - If the patient coughs involuntarily (due to bolus administration) before, during or after swallowing, this is assessed as “conspicuous”, and the examination is discontinued
    - «Coughing up to 3 minutes later» does not mean waiting 3 minutes after each swallow, but at the end of the “Solids” subtest wait for up to 3 minutes to see if a post-cough occurs.
    - If the patient does not cough, proceed with another test sip if the other three aspiration signs (prolonged oral phase, drooling, voice change) are also inconspicuous.

- Drooling:
    - If the food visibly runs out of the mouth again, this is called a “rated” conspicuous
    - If there is no drooling and the other three aspiration signs (prolonged oral phase, cough, voice change) are also inconspicuous, you may continue with another (slightly larger) cube of bread.

- Change of voice:
    - To hear a change in voice after swallowing bread with water, the patient must be able to produce voice (=phonate). First, ask the patient to say a long «Ohhhhh». If the voice sounds gargled, occupied or altered, as if saliva, mucus or bolus has accumulated in the throat, it is assessed as “conspicuous”, and the examination must be stopped. If you are unsure whether the voice is unclean, have the patient speak a long “Ahhhh”.
    - If the patient cannot give a voice, please listen again to the breathing sounds using a stethoscope (Fig.3)
    - If a change in voice (or gurgling breathing) is audible, the examination must be stopped
    - If the voice remains unchanged after the bolus swallow, and if the other three aspiration signs (prolonged oral phase, drooling, coughing) are also inconspicuous, proceed with another test swallow.

Scoring:

- If the patient reached 1 point, indicates no observable swallowing the patient has archieved 10 points, the GUSS-ICU has been completed successfully (Fig.13). Add up all the points (010) and enter the result in the “Total SUM” field at the bottom of the form (Fig. 13.)
- If the patient reached 0 point, the examination must be stopped completely.
- Per the GUSS-ICU`s dietary guidelines (points 9), the patient can safely consume semisolids passed fluids passed, solids passed, mixed textures failed (IDDSI 6 or 7 for food and IDDSI 0 for liquids)
- Per the GUSS-ICU`s dietary guidelines (points 10), the patient can safely consume all textures passed (IDDSI 7 for food and IDDSI 0 for liquids)
- The GUSS-ICU can be repeated as often as required, but in any case, always before changing to a different food consistency

	Direct Swallowing Test (4 subtests)		
		Pass	Fail
6 points: Proceed to "Direct Swallowing Test" < 6 points: Stop the screening (SLP and/or FEES)	1. Semisolid: Give 3-5 tsp. of thickened water (IDDSI 3) *	1	0
	2. Liquids: Give 3, 5, 10, 20, 50 ml of water (IDDSI 0) *	1	0
	3. Solids: Give a piece of bread (1.5 x 1.5cm) *	1	0
	4. Liquids & Solids: Give a piece of bread (1.5 x 1.5cm) and a sip of water after half of the chewing time *	1	0
	SUM:		
	TOTAL SUM:		

Fig. 13 GUSS-ICU test “Liquids & Solids” successful with 1 point

GUSS-ICU

Recommended for all patients who were intubated for more than 24 hours.

The screening is to be conducted no earlier than 1 hour after extubation. If necessary, perform oral hygiene.

Preliminary Investigation / Indirect Swallowing Test		
	Yes	No
RASS from 0 to +2	1	0
Stridor present	0	1
Coughing and/or throat clearing efficiently	1	0
Swallowing saliva possible	1	0
Drooling (saliva)	0	1
Change of voice after swallowing saliva	0	1
SUM:	6	

6 points: Proceed to "Direct Swallowing Test" < 6 points: Stop the screening (SLP and/or FEES)

Direct Swallowing Test (4 subtests)		
	Pass	Fail
1. Semisolid: Give 3-5 tsp. of thickened water (IDDSI 3) *	1	0
2. Liquids: Give 3, 5, 10, 20, 50 ml of water (IDDSI 0) *	1	0
3. Solids: Give a piece of bread (1.5 x 1.5cm) *	1	0
4. Liquids & Solids: Give a piece of bread (1.5 x 1.5cm) and a sip of water after half of the chewing time *	1	0
SUM:	4	
TOTAL SUM:	10	

* Observe the patient after each swallow.
Discontinue the subtest and the screening if the patient shows any of the following signs:
Difficulty swallowing (prolonged oral phase: > 10sec with liquids and semisolids, >23 sec. with bread), coughing, drooling or change of vocie.
If there are no visible problems, proceed to the next subtest. (IDDSI= International Dysphagia Standardization Initiative)

FEES (Fiberoptic Endoscopic Evaluation of Swallowing), IDDSI (International Dysphagia Standardization Initiative), RASS (Richmond Agitation Sedation Scale)

Troll C, Trapl-Grundschober M, Teuschl Y, Cerrito A, Compte MG, Siegemund M. A bedside swallowing screen for the identification of post-extubation dysphagia on the intensive care unit - validation of the Gugging Swall

Fig. 14 GUSS-ICU test: Successful in all subtest: Total score:10

List of figures:

List of tables:

Abbreviations/explanations:

GUSS-ICU	Gugging Swallowing Screen Intensive Care Unit
Drooling	Leakage of food or saliva from the mouth bolus.
Bolus	The amount of a food consistency that is ingested
IDDSI	International Dysphagia Diet Standardisation Initiative
RASS	Richmond Agitation Sedation Scale

Literature:

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