

Supplementary Table S1 Characteristics of the participants (n = 76)

Variable	n (%)
Course format	
Basic	57 (75.0)
Advanced	19 (25.0)
Mean age (year, IQR)	30 (27–32)
Sex	
Male	39 (51.3)
Female	37 (48.7)
Medical specialty	
Otorhinolaryngology	61 (80.3)
Oral and maxillofacial surgery	12 (15.8)
Internal medicine	2 (2.6)
Nuclear medicine	1 (1.3)
Position	
Resident	69 (90.8)
Specialist	7 (9.2)
Previous ultrasound course	
No	50 (65.8)
Yes	26 (34.2)
Course duration	
< 10 hours	4
10–20 hours	18
> 20 hours	5
Self-performed ultrasound examinations	
None	5 (6.6)
Less than 20	11 (14.5)
Between 20 and 50	19 (25.0)
Between 51 and 100	14 (18.4)
More than 100	27 (35.5)
Advanced course participants	15

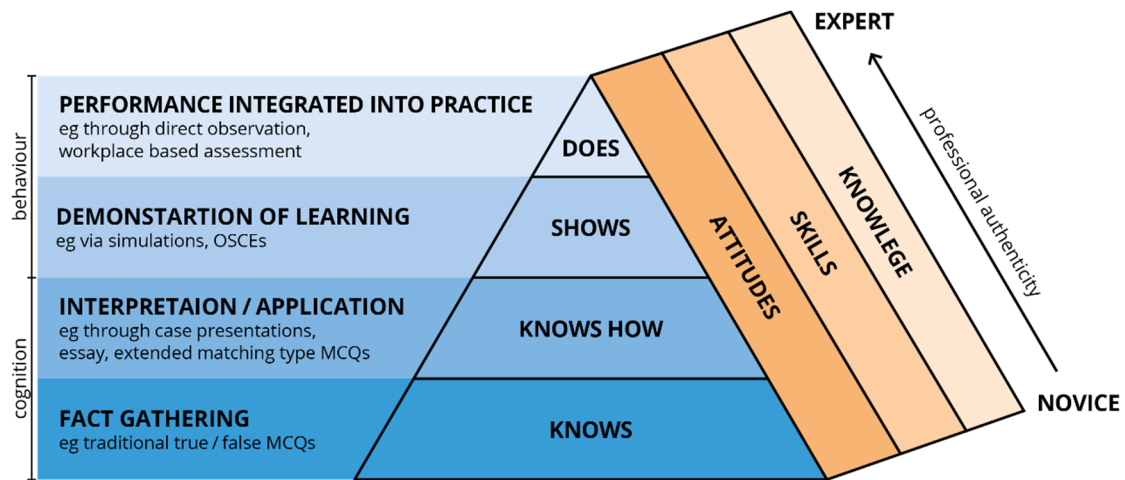
Variable	n (%)
Basic course participants	12
Pre-course self-assessment of competence	Score – 7-point Likert scale
Ultrasound device handling	4
Ultrasound probe handling	3
Knowledge of ultrasound anatomy	3
Practical ultrasound competence	3

IQR, interquartile range.

Supplementary Table S2 Characteristics of the examiners (n = 10)

Variable	n (%)
Sex	
Male	9 (90.0)
Female	1 (10.0)
Medical speciality	
Otorhinolaryngology	5 (50.0)
Neurosurgery	1 (10.0)
General surgery	1 (10.0)
Internal medicine	2 (20.0)
Neurology	1 (10.0)
Position	
Specialist	6 (60.0)
With DEGUM level II or III certification	4
Resident	4 (40.0)
Previous teaching experience	
Yes	10 (100.0)
No	0 (0.0)

Supplementary Figure S1 Miller's knowledge pyramid



Based on work by Miller GE, The Assessment of Clinical Skills / Competence / Performance: Acad. Med. 1990; 65(9); 63-67
Adapted by Drs. R. Mehav & R. Burns. UK (Jan 2009)

Supplementary Figure S2 Example direct observation of procedural skills (DOPS) test sheets: A

Examiner sheet; B Participant's task sheet; C Scoring scheme

A

HEAD-NECK-DOPS NR. 3: TOPIC "NECK - FLOOR OF MOUTH" – EXAMINER SHEET



AUDIT OBJECTIVE:

1) The examinee masters **guiding** the patient **through the examination**, in an appropriate manner appropriate to it

2) The examinee masters the **handling of the transducer** regarding:

- Orientation
- Positioning
- Connection
- adequate image setup and zoom factor

3) The examinee masters carrying out the **examination** in a correct way with regard to:

- ...**scanning of the floor of mouth including the tongue**
- ...**measurement of the sublingual gland comparing both sides**
- ...**explanation of the frozen standard section image "transverse view of the floor of mouth"**
- ...**storing or printing the image**
- ...**the overall performance**

CASE VIGNETTE: You are the doctor in charge at a polyclinic. A patient presents with unclear dysphagia and pain in swallowing. You would like to carry out an ultrasound examination on your patient.

TASK 1: Guide your patient through the **examination** in an appropriate manner (max. 6 points).

TASK 2: Scan the **floor of mouth including the tongue** completely in **both planes**. Initially, please present the **transverse default plane** and identify the following **anatomical structures** (max. 4 points):

- Mylohyoid muscle
- Tongue
- Digastric muscle
- Sublingual gland

TASK 3: Mark the **sublingual gland** and determine the size of the glands comparing both sides (double image mode if applicable) (max. 6 points)

TASK 4: Store or print an image (max. 1 point).

EXAMINER INFORMATION: Time allowance 10 minutes: 8 minutes of assessment, 2 minutes of feedback Please sum up the overall score after the assessment and do not hand out the exam paper. The exam paper contains three rating levels per task.

Green	Yellow	Red
The examinee completed the task in a correct and error-free way.	The examinee completed the task under difficulties / was reliant on the examiners assistance.	Despite the examiner's assistance, the examinee was not able to carry out the task adequately.

C

HEAD-NECK-DOPS NR. 3: TOPIC „NECK – FLOOR OF MOUTH“ – EVALUATION SHEET



EXAMINER: _____ **EXAMINEE:** _____

TASK 1: Guide your patient through the **examination** in an appropriate manner.

Patient guidance (max. 6 points)

or the examinee mentions: "Please overstretch your head and slightly tilt it to the side"	2 □	1 □	0 □
or the examinee mentions: "Please remove any clothes from your neck area"	2 □	1 □	0 □
or the examinee mentions: "Putting on gloves and handing paper towels to the patient."	2 □	1 □	0 □

TASK 2: Scan the **floor of mouth including the tongue** completely in **both planes**. Initially, please present the **transverse default plane** and identify the following **anatomical structures**: **Mylohyoid muscle, Digastric muscle, Tongue, Sublingual gland**

Handling of the transducer (max. 8 points)

Orientation	
Correct or immediately corrects after disconnecting the left / cranial part of the transducer	2 □
Corrects after initial difficulties or upon request	1 □
Relies on the examiners manual help to find the correct orientation	0 □
Positioning	
Correct or immediately transfers to the correct position after starting elsewhere	2 □
Corrects after initial difficulties or upon request	1 □
Relies on the examiners manual help to find the correct positioning	0 □
Connection	
Connects the transducer adequately using enough ultrasound gel / adjusting the pressure	2 □
Corrects after initial difficulties or upon request	1 □
Inadequate pressure / not enough ultrasound gel / not able to connect the transducer to the patient without manual help	0 □
adequate image setup and zoom factor	
Independently sets up an adequate image regarding gain, depth, frequency and focus settings	2 □
Corrects after initial difficulties or upon request	1 □
Relies on the examiners manual help to obtain an appropriate image setup	0 □

Scanning performance (max. 8 points)

Transverse scanning	
Scans floor of mouth and tongue completely in transversal plane in a reasonable time frame	3 □
Does not scan every structure entirely (e.g. forgets to increase the depth to examine the tongue) or inadequate time frame	2 □
Relies on manual help to scan the area or only scans marginal parts of the floor of mouth	1 □
No adequate examination possible despite the examiners manual help	0 □
Sagittal scanning	
Scans floor of mouth and tongue completely in sagittal plane in a reasonable time frame	3 □
Does not scan every structure entirely (e.g. forgets to increase the depth to examine the tongue) or inadequate time frame	2 □
Relies on manual help to scan the area or only scans marginal parts of the floor of mouth	1 □
No adequate examination possible despite the examiners manual help	0 □

TASK 3: Mark the **sublingual gland** and determine the size of the glands comparing both sides (double image mode if applicable)

Measurement (max. 6 points)

Depicts both glands correctly applying double image mode and uses correct endpoints for the measurement	6 □
Inadequate image setting of both glands or wrong endpoints / corrects upon the examiners verbal request	4 □
Relies on manual help to carry out the image setting and measurements	2 □
No adequate image setup / measurements despite the examiners manual help	0 □

TASK 2+4: Explain and store or print an image.

Explanation and image documentation: Points out and identifies the following anatomical structures correctly (max. 5 points)

Mylohyoid muscle	1 □	Tongue	1 □
Digastric muscle	1 □	Sublingual gland	1 □
Store or print the image	1 □		

OVERALL PERFORMANCE: The overall performance is rated with: (max. 6 points - circle the number)

1 - 2 - 3 - 4 - 5 - 6

OVERALL SCORE: _____ / 37

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