

Supplemental Material S1. Preliminary normative data for VASES.

The data contained within this document are preliminary norms of typical swallow function observed during flexible endoscopic evaluation of swallowing (FEES). Norms were interpreted using the Visual Analysis of Swallowing Efficiency and Safety (VASES), derived from 39 healthy, nondysphagic, community-dwelling adults. Demographic information of the 39 adults is listed below.

	Total (<i>N</i> = 39)
Age (years)	
Mean (<i>SD</i>)	50.2 (14.5)
Median [Q1, Q3]	48.0 [40.5, 60.0]
Min, Max	27.0, 83.0
Height (inches)	
Mean (<i>SD</i>)	67.2 (2.86)
Median [Q1, Q3]	67.0 [65.0, 69.0]
Min, Max	62.0, 72.0
Weight (pounds)	
Mean (<i>SD</i>)	161 (29.3)
Median [Q1, Q3]	160 [140, 179]
Min, Max	110, 233
Body Mass Index	
Mean (<i>SD</i>)	25.1 (5.12)
Median [Q1, Q3]	24.4 [21.3, 27.2]
Min, Max	18.5, 37.7
Sex	
Female	20 (51.3%)
Male	19 (48.7%)
Gender	
Man	19 (48.7%)
Woman	20 (51.3%)
Race/Ethnicity	
Asian	1 (2.6%)
Black or African American	10 (25.6%)
Hispanic or Latino	5 (12.8%)
Multi-Racial	3 (7.7%)
White	20 (51.3%)

Functional Swallowing Outcomes of VASES

The primary functional swallowing outcomes of VASES include: six residue ratings, Penetration-Aspiration Scale (PAS), and bolus location at swallow onset. Details on each of these measures are described below. In addition to the primary VASES outcome measures, the number of swallows seen during the FEES were also recorded for each trial. Sip

size and bite size was also measured for each self-selected volume swallowing trial. For more detailed information on the rating methodology of VASES, see [_____](#)

Residue Ratings

Residue ratings are percentage-based visual-perceptual estimations of the amount of residue filling or covering each of VASES' six anatomic landmarks. Ratings typically range from 0-100%. Residue is considered 'absent' if 0% and 'present' if > 0%.

Penetration Aspiration Scale (PAS)

The PAS is an 8-point scale used to judge the depth of and reaction to airway invasion. The 8-point PAS is summarized below. The original PAS publication can be found using the following link:

Not Airway Invasion

- **PAS 1.** No penetration or aspiration.

Penetration

- **PAS 2.** Material enters the laryngeal vestibule and is ejected entirely from the laryngeal vestibule.
- **PAS 3.** Material enters the laryngeal vestibule but is not ejected entirely from the laryngeal vestibule.
- **PAS 4.** Material enters the airway, contacts the vocal folds, and is ejected entirely from both the laryngeal vestibule and the vocal folds.
- **PAS 5.** Material enters the airway, contacts the vocal folds, but is not ejected entirely from either the laryngeal vestibule or the vocal folds.

Aspiration

- **PAS 6.** Material enters the vestibule, passes below the vocal folds and into the subglottis, but is ejected entirely from the subglottis.
 - Note: Material can be remaining on the vocal folds or in the laryngeal vestibule.
- **PAS 7.** Material enters the vestibule, passes below the vocal folds and into the subglottis, but is not ejected entirely from the subglottis despite effort
- **PAS 8.** Material enters the vestibule, passes below the vocal folds and into the subglottis, and is not ejected entirely from the subglottis with no attempt to eject being made.

Bolus location at swallow onset

This refers to the location of the bolus at the onset of 'during the swallow', as defined by VASES. Trials were rated as present in the 'Oral Cavity Only' if no bolus was observed endoscopically at the onset of the swallow and nothing was observed in the pharynx or larynx. If boluses were endoscopically observed within the pharynx or larynx, then ratings of present or absent were provided for each of VASES six anatomic landmarks. Bolus location at swallow onset was not judged if the onset of the swallow was not observed due to camera obstruction.

Interpretation of VASES Norms for Clinical Use

In practice, many clinicians use reference values (normative data) to categorize the extent to which a person's swallow performance is 'normal' or 'abnormal.' When data are normally distributed, it is common practice to use means and standard deviations as a method for estimating what is vs is not 'normal.' Data that are less than one standard deviation from the mean are commonly referred to as 'normal.' Data that are 1-2 standard deviations from the mean are commonly referred to as atypical. Data that are >2 standard deviations from the mean are commonly referred to as extremely unusual.

When data are not normally distributed (skewed), means and standard deviations should be avoided. Instead, skewed data should be interpreted using percentiles. In these instances, the median (50th percentile) is akin to the 'mean'. Data that are between the 25th-75th percentile range are commonly referred to as normal. Data that are within the 24th-5th or 76th-95th percentile ranges are commonly referred to as atypical. Data that are less than the 5th percentile or greater than the 95th percentile are commonly referred to as extremely unusual.

Using the above approach to interpret findings in clinical practice provides as a quick and convenient way to grossly describe a person's swallow performance. However, two important notes need to be emphasized when taking this approach. First, it is important to note that normality exists along a continuum. While using categories to describe how abnormal (i.e., atypical vs. extremely unusual) a swallow finding is common in clinical practice, the boundaries to develop such categorizations are arbitrary. Therefore, clinicians are encouraged to use categorical descriptors as soft guidelines rather than definitive diagnostic markers. Second, normative data are developed from samples of people which are used to apply to a larger population of people. However, the normative data may not reflect the *true* population normative data. Normative data are expected to become increasingly more accurate as normative data sample sizes increase. Therefore, clinicians should keep in mind that normative data may change as additional studies with larger sample sizes accumulate.

Standardized Swallowing Protocol

Each participant completed the same standardized protocol involving 15 trials across 8 swallowing conditions (listed below). A 3.0 mm distal chip flexible laryngoscope was used with an LED light source that was white balanced before every examination. Water was used to lubricate the endoscope. No topical nasal anesthetics or decongestants were used. Participants were also asked to avoid talking throughout the exam, unless needing to express discomfort or concern. This was done in order to optimize temporal boundaries for VASES interpretation. Participants were encouraged to respond naturally with throat clears or coughs, as needed. Sips of clear water were used intermittently to clear residue from previous swallows and reduce gunking of the camera lens.

All boluses were self-administered, non-held, and non-cued. Instructions for each swallow condition were provided prior to bolus delivery to avoid any effect of verbal cueing. During 'natural' swallowing conditions, participants were asked to take a sip and "drink this like you normally would." During the 'single swallow' swallowing conditions, participants were asked to take a bite or sip and "swallow it in just one swallow – try not to do any extra swallows. Try to wait at least 5 seconds before doing a second or third swallow, so that we can see what you look like after just one swallow."

The self-selected volume of thin liquid via cup, natural, was given using an 8-ounce cup filled approximately with 130 mL of water. The self-selected volume of thin liquid via cup, single-swallow, was given using an 8-ounce cup filled approximately with 110 mL of water. The self-selected volume of saltine cracker, single-swallow, was given using a 3.10 gram saltine cracker.

All liquid swallowing conditions, except for the 90 mL liquid swallowing condition, were repeated twice: once with green opaque water with minimal-to-no coating effect, and once with white dyed water with maximal coating effect. The 90 mL was completed once, with white dyed water with maximal coating effect. The blue dyed pudding and non-dyed crackers were each repeated twice.

Swallow Conditions (click on below text to link to condition-specific normative data)

- [All swallow conditions and trials](#)
- [Self-selected volume of thin liquid via cup, natural](#)
- [5 mL of thin liquid via cup, single swallow](#)
- [10 mL of thin liquid via cup, single swallow](#)
- [20 mL of thin liquid via cup, single swallow](#)
- [Self-selected volume of thin liquid via cup, single swallow](#)
- [90 mL of thin liquid via cup, uninterrupted sequential swallows](#)
- [5 mL, blue pudding via spoon, single swallow](#)
- [Self-selected volume of saltine cracker, single swallow](#)

Descriptive Statistics of Across All Swallowing Trials

	All Trials (N = 584)
Number of Swallows	
1	427 (73.1%)
2	105 (18.0%)
3	19 (3.3%)
4	6 (1.0%)
5	8 (1.4%)
6	2 (0.3%)
7	5 (0.9%)
8	3 (0.5%)
9	3 (0.5%)
11	2 (0.3%)
13	2 (0.3%)
14	2 (0.3%)
Bolus Location at Swallow Onset: Oral Cavity Only	
Present	319 (54.6%)
Absent	244 (41.8%)
Missing	21 (3.6%)
Bolus Location at Swallow Onset: Oropharynx	
Present	229 (39.2%)
Absent	334 (57.2%)
Missing	21 (3.6%)
Bolus Location at Swallow Onset: Hypopharynx	
Present	84 (14.4%)
Absent	477 (81.7%)
Missing	23 (3.9%)
Bolus Location at Swallow Onset: Epiglottis	
Present	70 (12.0%)
Absent	493 (84.4%)
Missing	21 (3.6%)
Bolus Location at Swallow Onset: Laryngeal Vestibule	
Present	6 (1.0%)
Absent	557 (95.4%)
Missing	21 (3.6%)
Bolus Location at Swallow Onset: Vocal Folds	
Present	1 (0.2%)
Absent	562 (96.2%)
Missing	21 (3.6%)

	All Trials (N = 584)
Bolus Location at Swallow Onset: Subglottis	
Absent	563 (96.4%)
Missing	21 (3.6%)
Oropharyngeal Residue: Present vs. Absent	
Absent	34 (5.8%)
Present	550 (94.2%)
Oropharyngeal Residue: Amount When Present	
Mean (SD)	3.06 (4.93)
Median [Q1, Q3]	2.00 [1.50, 3.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	5.00, 7.00, 10.1, 16.0
Min, Max	1.00, 89.0
Missing	34 (5.8%)
Hypopharyngeal Residue: Present vs. Absent	
Absent	78 (13.4%)
Present	506 (86.6%)
Hypopharyngeal Residue: Amount When Present	
Mean (SD)	1.92 (3.01)
Median [Q1, Q3]	1.50 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.00, 3.50, 4.00, 4.50
Min, Max	1.00, 64.0
Missing	78 (13.4%)
Epiglottic Residue: Present vs. Absent	
Absent	204 (34.9%)
Present	380 (65.1%)
Epiglottic Residue: Amount When Present	
Mean (SD)	6.41 (8.97)
Median [Q1, Q3]	3.00 [2.00, 6.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	15.0, 25.1, 38.0, 42.8
Min, Max	1.00, 70.0
Missing	204 (34.9%)
Laryngeal Vestibule Residue: Present vs. Absent	
Absent	446 (76.4%)
Present	138 (23.6%)

	All Trials (N = 584)
Laryngeal Vestibule Residue: Amount When Present	
Mean (SD)	5.32 (7.74)
Median [Q1, Q3]	3.00 [2.00, 4.50]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	11.3, 18.9, 34.2, 39.6
Min, Max	0.500, 42.0
Missing	446 (76.4%)
Vocal Fold Residue: Present vs. Absent	
Absent	555 (95.0%)
Present	29 (5.0%)
Vocal Fold Residue: Amount When Present	
Mean (SD)	10.0 (15.9)
Median [Q1, Q3]	3.50 [2.50, 7.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.40
Percentiles: 90%, 95%, 97.5%, 99%	33.6, 49.0, 56.5, 58.6
Min, Max	1.00, 60.0
Missing	555 (95.0%)
Subglottic Residue: Present vs. Absent	
Absent	579 (99.1%)
Present	5 (0.9%)
Subglottic Residue: Amount When Present	
Mean (SD)	25.6 (37.1)
Median [Q1, Q3]	10.0 [3.00, 24.0]
Percentiles: 1%, 2.5%, 5%, 10%	1.08, 1.20, 1.40, 1.80
Percentiles: 90%, 95%, 97.5%, 99%	63.6, 76.8, 83.4, 87.4
Min, Max	1.00, 90.0
Missing	579 (99.1%)
PAS	
1	440 (75.3%)
2	4 (0.7%)
3	110 (18.8%)
4	0 (0%)
5	25 (4.3%)
6	0 (0%)
7	3 (0.5%)
8	2 (0.3%)

Swallow Condition: Self-Selected Volume of Thin Liquid via Cup, Natural

	Green opaque (N = 39)	White coating (N = 39)
Sip/Bite Size		
Mean (SD)	19.1 (8.75)	22.3 (12.3)
Median [Q1, Q3]	18.0 [12.5, 23.0]	20.0 [14.0, 26.0]
Percentiles: 1%, 2.5%, 5%, 10%	5.76, 6.90, 8.80, 9.00	6.38, 6.95, 9.70, 12.0
Percentiles: 90%, 95%, 97.5%, 99%	33.2, 36.1, 37.3, 40.1	34.6, 43.8, 51.9, 62.2
Min, Max	5.00, 42.0	6.00, 69.0
Number of Swallows		
1	23 (59.0%)	24 (61.5%)
2	14 (35.9%)	12 (30.8%)
3	2 (5.1%)	3 (7.7%)
Bolus Location at Swallow Onset: Oral Cavity Only		
Present	20 (51.3%)	26 (66.7%)
Absent	16 (41.0%)	11 (28.2%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Oropharynx		
Present	14 (35.9%)	9 (23.1%)
Absent	22 (56.4%)	28 (71.8%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Hypopharynx		
Present	10 (25.6%)	7 (17.9%)
Absent	26 (66.7%)	30 (76.9%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Epiglottis		
Present	8 (20.5%)	3 (7.7%)
Absent	28 (71.8%)	34 (87.2%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Laryngeal Vestibule		
Present	1 (2.6%)	0 (0%)
Absent	35 (89.7%)	37 (94.9%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Vocal Folds		
Present	0 (0%)	0 (0%)
Absent	36 (92.3%)	37 (94.9%)
Missing	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Subglottis		
Absent	36 (92.3%)	37 (94.9%)
Missing	3 (7.7%)	2 (5.1%)

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Oropharyngeal Residue: Present vs. Absent		
Absent	1 (2.6%)	0 (0%)
Present	38 (97.4%)	39 (100%)
Oropharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	2.38 (1.85)	2.65 (3.61)
Median [Q1, Q3]	1.75 [1.00, 2.88]	2.00 [1.50, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	4.30, 6.58, 7.15, 8.26	4.30, 6.05, 7.33, 16.7
Min, Max	1.00, 9.00	1.00, 23.0
Missing	1 (2.6%)	0 (0%)
Hypopharyngeal Residue: Present vs. Absent		
Absent	2 (5.1%)	0 (0%)
Present	37 (94.9%)	39 (100%)
Hypopharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	1.49 (0.571)	1.69 (0.749)
Median [Q1, Q3]	1.50 [1.00, 2.00]	1.50 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	2.20, 2.50, 2.55, 2.82	3.00, 3.00, 3.05, 3.62
Min, Max	1.00, 3.00	1.00, 4.00
Missing	2 (5.1%)	0 (0%)
Epiglottic Residue: Present vs. Absent		
Absent	15 (38.5%)	2 (5.1%)
Present	24 (61.5%)	37 (94.9%)
Epiglottic Residue: Amount When Present		
Mean (<i>SD</i>)	5.29 (7.92)	6.01 (8.52)
Median [Q1, Q3]	2.50 [2.00, 4.63]	3.00 [1.50, 5.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.15	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	9.40, 16.8, 26.5, 33.4	14.8, 25.4, 28.4, 36.0
Min, Max	1.00, 38.0	1.00, 41.0
Missing	15 (38.5%)	2 (5.1%)
Laryngeal Vestibule Residue: Present vs. Absent		
Absent	27 (69.2%)	26 (66.7%)
Present	12 (30.8%)	13 (33.3%)
Laryngeal Vestibule Residue: Amount When Present		
Mean (<i>SD</i>)	2.71 (1.44)	6.65 (10.2)
Median [Q1, Q3]	2.00 [2.00, 2.63]	2.50 [2.00, 7.00]
Percentiles: 1%, 2.5%, 5%, 10%	2.00, 2.00, 2.00, 2.00	1.00, 1.00, 1.00, 1.20

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Percentiles: 90%, 95%, 97.5%, 99%	3.45, 5.08, 6.04, 6.62	11.1, 22.8, 30.9, 35.8
Min, Max	2.00, 7.00	1.00, 39.0
Missing	27 (69.2%)	26 (66.7%)
Vocal Fold Residue: Present vs. Absent		
Absent	38 (97.4%)	36 (92.3%)
Present	1 (2.6%)	3 (7.7%)
Vocal Fold Residue: Amount When Present		
Mean (<i>SD</i>)	NA	2.17 (0.764)
Median [Q1, Q3]	4.00 [4.00, 4.00]	2.00 [1.75, 2.50]
Percentiles: 1%, 2.5%, 5%, 10%	4.00, 4.00, 4.00, 4.00	1.51, 1.53, 1.55, 1.60
Percentiles: 90%, 95%, 97.5%, 99%	4.00, 4.00, 4.00, 4.00	2.80, 2.90, 2.95, 2.98
Min, Max	4.00, 4.00	1.50, 3.00
Missing	38 (97.4%)	36 (92.3%)
Subglottic Residue: Present vs. Absent		
Absent	39 (100%)	39 (100%)
Subglottic Residue: Amount When Present		
Mean (<i>SD</i>)	NA	NA
Median [Q1, Q3]	NA	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA	NA
Min, Max	NA	NA
Missing	39 (100%)	39 (100%)
PAS		
1	26 (66.7%)	26 (66.7%)
2	1 (2.6%)	0 (0%)
3	10 (25.6%)	10 (25.6%)
4	0 (0%)	0 (0%)
5	2 (5.1%)	3 (7.7%)
6	0 (0%)	0 (0%)
7	0 (0%)	0 (0%)
8	0 (0%)	0 (0%)

Swallow Condition: 5 mL Thin Liquid via Cup, Single Swallow

	Green opaque (N = 39)	White coating (N = 39)
Number of Swallows		
1	34 (87.2%)	37 (94.9%)
2	4 (10.3%)	2 (5.1%)
3	1 (2.6%)	0 (0%)
Bolus Location at Swallow Onset: Oral Cavity Only		
Present	20 (51.3%)	24 (61.5%)
Absent	18 (46.2%)	12 (30.8%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Oropharynx		
Present	17 (43.6%)	11 (28.2%)
Absent	21 (53.8%)	25 (64.1%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Hypopharynx		
Present	8 (20.5%)	4 (10.3%)
Absent	30 (76.9%)	32 (82.1%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Epiglottis		
Present	6 (15.4%)	2 (5.1%)
Absent	32 (82.1%)	34 (87.2%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Laryngeal Vestibule		
Present	1 (2.6%)	0 (0%)
Absent	37 (94.9%)	36 (92.3%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Vocal Folds		
Present	0 (0%)	0 (0%)
Absent	38 (97.4%)	36 (92.3%)
Missing	1 (2.6%)	3 (7.7%)
Bolus Location at Swallow Onset: Subglottis		
Absent	38 (97.4%)	36 (92.3%)
Missing	1 (2.6%)	3 (7.7%)
Oropharyngeal Residue: Present vs. Absent		
Absent	1 (2.6%)	0 (0%)
Present	38 (97.4%)	39 (100%)
Oropharyngeal Residue: Amount When Present		
Mean (SD)	2.11 (1.06)	2.19 (1.31)
Median [Q1, Q3]	2.00 [1.50, 2.50]	2.00 [1.50, 2.50]

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	4.00, 4.00, 4.08, 4.63	3.00, 4.05, 4.70, 6.98
Min, Max	1.00, 5.00	1.00, 8.50
Missing	1 (2.6%)	0 (0%)
Hypopharyngeal Residue: Present vs. Absent		
Absent	4 (10.3%)	0 (0%)
Present	35 (89.7%)	39 (100%)
Hypopharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	1.69 (0.814)	1.67 (0.691)
Median [Q1, Q3]	1.50 [1.00, 2.00]	1.50 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	2.80, 3.50, 3.58, 3.83	3.00, 3.00, 3.00, 3.00
Min, Max	1.00, 4.00	1.00, 3.00
Missing	4 (10.3%)	0 (0%)
Epiglottic Residue: Present vs. Absent		
Absent	20 (51.3%)	0 (0%)
Present	19 (48.7%)	39 (100%)
Epiglottic Residue: Amount When Present		
Mean (<i>SD</i>)	3.61 (2.71)	4.95 (6.87)
Median [Q1, Q3]	2.00 [2.00, 5.25]	2.00 [1.50, 4.50]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	7.00, 7.40, 9.20, 10.3	14.0, 19.7, 21.6, 27.8
Min, Max	1.00, 11.0	1.00, 32.0
Missing	20 (51.3%)	0 (0%)
Laryngeal Vestibule Residue: Present vs. Absent		
Absent	35 (89.7%)	31 (79.5%)
Present	4 (10.3%)	8 (20.5%)
Laryngeal Vestibule Residue: Amount When Present		
Mean (<i>SD</i>)	4.63 (2.56)	4.00 (5.40)
Median [Q1, Q3]	5.25 [4.00, 5.88]	2.00 [1.00, 4.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.12, 1.30, 1.60, 2.20	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	6.55, 6.78, 6.89, 6.96	7.90, 12.5, 14.7, 16.1
Min, Max	1.00, 7.00	1.00, 17.0
Missing	35 (89.7%)	31 (79.5%)
Vocal Fold Residue: Present vs. Absent		
Absent	39 (100%)	39 (100%)

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Vocal Fold Residue: Amount When Present		
Mean (<i>SD</i>)	NA	NA
Median [Q1, Q3]	NA	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA	NA
Min, Max	NA	NA
Missing	39 (100%)	39 (100%)
Subglottic Residue: Present vs. Absent		
Absent	39 (100%)	39 (100%)
Subglottic Residue: Amount When Present		
Mean (<i>SD</i>)	NA	NA
Median [Q1, Q3]	NA	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA	NA
Min, Max	NA	NA
Missing	39 (100%)	39 (100%)
PAS		
1	35 (89.7%)	31 (79.5%)
2	0 (0%)	0 (0%)
3	4 (10.3%)	8 (20.5%)
4	0 (0%)	0 (0%)
5	0 (0%)	0 (0%)
6	0 (0%)	0 (0%)
7	0 (0%)	0 (0%)
8	0 (0%)	0 (0%)

Swallow Condition: 10 mL Thin Liquid via Cup, Single Swallow

	Green opaque (N = 39)	White coating (N = 39)
Number of Swallows		
1	30 (76.9%)	33 (84.6%)
2	8 (20.5%)	6 (15.4%)
3	1 (2.6%)	0 (0%)
Bolus Location at Swallow Onset: Oral Cavity Only		
Present	21 (53.8%)	21 (53.8%)
Absent	17 (43.6%)	17 (43.6%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Oropharynx		
Present	16 (41.0%)	16 (41.0%)
Absent	22 (56.4%)	22 (56.4%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Hypopharynx		
Present	7 (17.9%)	8 (20.5%)
Absent	31 (79.5%)	30 (76.9%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Epiglottis		
Present	4 (10.3%)	4 (10.3%)
Absent	34 (87.2%)	34 (87.2%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Laryngeal Vestibule		
Present	1 (2.6%)	0 (0%)
Absent	37 (94.9%)	38 (97.4%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Vocal Folds		
Present	0 (0%)	0 (0%)
Absent	38 (97.4%)	38 (97.4%)
Missing	1 (2.6%)	1 (2.6%)
Bolus Location at Swallow Onset: Subglottis		
Absent	38 (97.4%)	38 (97.4%)
Missing	1 (2.6%)	1 (2.6%)
Oropharyngeal Residue: Present vs. Absent		
Absent	2 (5.1%)	1 (2.6%)
Present	37 (94.9%)	38 (97.4%)
Oropharyngeal Residue: Amount When Present		
Mean (SD)	2.14 (0.991)	2.53 (1.38)
Median [Q1, Q3]	2.00 [1.50, 3.00]	2.00 [1.50, 3.00]

	Green opaque (N = 39)	White coating (N = 39)
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.20, 3.70, 4.55, 4.82	5.00, 5.15, 6.00, 6.00
Min, Max	1.00, 5.00	1.00, 6.00
Missing	2 (5.1%)	1 (2.6%)
Hypopharyngeal Residue: Present vs. Absent		
Absent	4 (10.3%)	1 (2.6%)
Present	35 (89.7%)	38 (97.4%)
Hypopharyngeal Residue: Amount When Present		
Mean (SD)	1.74 (0.965)	1.87 (0.852)
Median [Q1, Q3]	1.50 [1.00, 2.00]	2.00 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.30, 4.00, 4.00, 4.00	2.65, 4.00, 4.04, 4.32
Min, Max	1.00, 4.00	1.00, 4.50
Missing	4 (10.3%)	1 (2.6%)
Epiglottic Residue: Present vs. Absent		
Absent	17 (43.6%)	4 (10.3%)
Present	22 (56.4%)	35 (89.7%)
Epiglottic Residue: Amount When Present		
Mean (SD)	3.70 (2.95)	7.30 (8.95)
Median [Q1, Q3]	3.00 [2.63, 4.00]	4.00 [2.00, 8.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.20
Percentiles: 90%, 95%, 97.5%, 99%	5.90, 6.95, 10.8, 13.3	15.3, 26.8, 32.5, 37.6
Min, Max	1.00, 15.0	1.00, 41.0
Missing	17 (43.6%)	4 (10.3%)
Laryngeal Vestibule Residue: Present vs. Absent		
Absent	30 (76.9%)	23 (59.0%)
Present	9 (23.1%)	16 (41.0%)
Laryngeal Vestibule Residue: Amount When Present		
Mean (SD)	3.22 (3.02)	2.91 (2.03)
Median [Q1, Q3]	2.00 [2.00, 3.00]	2.50 [1.50, 3.13]
Percentiles: 1%, 2.5%, 5%, 10%	1.50, 1.50, 1.50, 1.50	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	5.40, 8.20, 9.60, 10.4	5.50, 7.25, 7.63, 7.85
Min, Max	1.50, 11.0	1.00, 8.00
Missing	30 (76.9%)	23 (59.0%)
Vocal Fold Residue: Present vs. Absent		
Absent	36 (92.3%)	36 (92.3%)
Present	3 (7.7%)	3 (7.7%)

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Vocal Fold Residue: Amount When Present		
Mean (SD)	3.17 (0.764)	21.3 (33.5)
Median [Q1, Q3]	3.00 [2.75, 3.50]	3.00 [2.00, 31.5]
Percentiles: 1%, 2.5%, 5%, 10%	2.51, 2.53, 2.55, 2.60	1.04, 1.10, 1.20, 1.40
Percentiles: 90%, 95%, 97.5%, 99%	3.80, 3.90, 3.95, 3.98	48.6, 54.3, 57.2, 58.9
Min, Max	2.50, 4.00	1.00, 60.0
Missing	36 (92.3%)	36 (92.3%)
Subglottic Residue: Present vs. Absent		
Absent	39 (100%)	38 (97.4%)
Present	0 (0%)	1 (2.6%)
Subglottic Residue: Amount When Present		
Mean (SD)	NA	NA
Median [Q1, Q3]	NA	90.0 [90.0, 90.0]
Percentiles: 1%, 2.5%, 5%, 10%	NA	90.0, 90.0, 90.0, 90.0
Percentiles: 90%, 95%, 97.5%, 99%	NA	90.0, 90.0, 90.0, 90.0
Min, Max	NA	90.0, 90.0
Missing	39 (100%)	38 (97.4%)
PAS		
1	30 (76.9%)	23 (59.0%)
2	0 (0%)	0 (0%)
3	6 (15.4%)	13 (33.3%)
4	0 (0%)	0 (0%)
5	3 (7.7%)	2 (5.1%)
6	0 (0%)	0 (0%)
7	0 (0%)	1 (2.6%)
8	0 (0%)	0 (0%)

Swallow Condition: 20 mL Thin Liquid via Cup, Single Swallow

	Green opaque (N = 39)	White coating (N = 39)
Number of Swallows		
1	28 (71.8%)	26 (66.7%)
2	8 (20.5%)	11 (28.2%)
3	3 (7.7%)	2 (5.1%)
Bolus Location at Swallow Onset: Oral Cavity Only		
Present	24 (61.5%)	22 (56.4%)
Absent	14 (35.9%)	15 (38.5%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Oropharynx		
Present	13 (33.3%)	14 (35.9%)
Absent	25 (64.1%)	23 (59.0%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Hypopharynx		
Present	6 (15.4%)	6 (15.4%)
Absent	32 (82.1%)	31 (79.5%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Epiglottis		
Present	4 (10.3%)	5 (12.8%)
Absent	34 (87.2%)	32 (82.1%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Laryngeal Vestibule		
Present	0 (0%)	1 (2.6%)
Absent	38 (97.4%)	36 (92.3%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Vocal Folds		
Present	0 (0%)	1 (2.6%)
Absent	38 (97.4%)	36 (92.3%)
Missing	1 (2.6%)	2 (5.1%)
Bolus Location at Swallow Onset: Subglottis		
Absent	38 (97.4%)	37 (94.9%)
Missing	1 (2.6%)	2 (5.1%)
Oropharyngeal Residue: Present vs. Absent		
Absent	1 (2.6%)	0 (0%)
Present	38 (97.4%)	39 (100%)
Oropharyngeal Residue: Amount When Present		
Mean (SD)	3.09 (2.08)	3.18 (3.47)
Median [Q1, Q3]	2.50 [2.00, 3.88]	2.00 [1.50, 3.00]

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	5.65, 6.15, 7.30, 9.52	5.50, 10.9, 14.2, 15.9
Min, Max	1.00, 11.0	1.00, 17.0
Missing	1 (2.6%)	0 (0%)
Hypopharyngeal Residue: Present vs. Absent		
Absent	3 (7.7%)	0 (0%)
Present	36 (92.3%)	39 (100%)
Hypopharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	1.93 (0.888)	1.82 (0.885)
Median [Q1, Q3]	2.00 [1.00, 2.13]	2.00 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.00, 3.25, 4.06, 4.33	2.50, 3.10, 4.08, 4.93
Min, Max	1.00, 4.50	1.00, 5.50
Missing	3 (7.7%)	0 (0%)
Epiglottic Residue: Present vs. Absent		
Absent	18 (46.2%)	0 (0%)
Present	21 (53.8%)	39 (100%)
Epiglottic Residue: Amount When Present		
Mean (<i>SD</i>)	5.19 (4.12)	7.91 (10.4)
Median [Q1, Q3]	4.00 [3.00, 6.00]	4.00 [2.50, 7.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.10, 1.25, 1.50, 2.00	1.00, 1.00, 1.45, 1.50
Percentiles: 90%, 95%, 97.5%, 99%	7.50, 8.00, 14.5, 18.4	17.6, 26.3, 38.7, 46.7
Min, Max	1.00, 21.0	1.00, 52.0
Missing	18 (46.2%)	0 (0%)
Laryngeal Vestibule Residue: Present vs. Absent		
Absent	30 (76.9%)	21 (53.8%)
Present	9 (23.1%)	18 (46.2%)
Laryngeal Vestibule Residue: Amount When Present		
Mean (<i>SD</i>)	3.61 (2.29)	5.69 (6.36)
Median [Q1, Q3]	3.00 [2.00, 4.00]	3.00 [2.00, 6.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.08, 1.20, 1.40, 1.80	0.585, 0.713, 0.925, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	7.10, 7.30, 7.40, 7.46	14.2, 18.1, 21.0, 22.8
Min, Max	1.00, 7.50	0.500, 24.0
Missing	30 (76.9%)	21 (53.8%)
Vocal Fold Residue: Present vs. Absent		
Absent	39 (100%)	34 (87.2%)
Present	0 (0%)	5 (12.8%)

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Vocal Fold Residue: Amount When Present		
Mean (<i>SD</i>)	NA	4.00 (2.15)
Median [Q1, Q3]	NA	4.00 [3.50, 4.50]
Percentiles: 1%, 2.5%, 5%, 10%	NA	1.10, 1.25, 1.50, 2.00
Percentiles: 90%, 95%, 97.5%, 99%	NA	6.00, 6.50, 6.75, 6.90
Min, Max	NA	1.00, 7.00
Missing	39 (100%)	34 (87.2%)
Subglottic Residue: Present vs. Absent		
Absent	39 (100%)	38 (97.4%)
Present	0 (0%)	1 (2.6%)
Subglottic Residue: Amount When Present		
Mean (<i>SD</i>)	NA	NA
Median [Q1, Q3]	NA	3.00 [3.00, 3.00]
Percentiles: 1%, 2.5%, 5%, 10%	NA	3.00, 3.00, 3.00, 3.00
Percentiles: 90%, 95%, 97.5%, 99%	NA	3.00, 3.00, 3.00, 3.00
Min, Max	NA	3.00, 3.00
Missing	39 (100%)	38 (97.4%)
PAS		
1	30 (76.9%)	20 (51.3%)
2	0 (0%)	0 (0%)
3	9 (23.1%)	14 (35.9%)
4	0 (0%)	0 (0%)
5	0 (0%)	4 (10.3%)
6	0 (0%)	0 (0%)
7	0 (0%)	0 (0%)
8	0 (0%)	1 (2.6%)

Swallow Condition: Self-Selected Volume of Thin Liquid via Cup, Single Swallow

	Green opaque (N = 39)	White coating (N = 39)
Sip/Bite Size		
Mean (SD)	18.1 (9.72)	19.8 (10.6)
Median [Q1, Q3]	16.0 [12.0, 21.5]	18.0 [13.0, 22.5]
Percentiles: 1%, 2.5%, 5%, 10%	5.00, 5.00, 5.90, 7.00	4.38, 4.95, 7.70, 9.00
Percentiles: 90%, 95%, 97.5%, 99%	30.6, 34.9, 43.2, 45.5	34.2, 42.0, 42.4, 47.0
Min, Max	5.00, 47.0	4.00, 50.0
Number of Swallows		
1	30 (76.9%)	31 (79.5%)
2	9 (23.1%)	8 (20.5%)
Bolus Location at Swallow Onset: Oral Cavity Only		
Present	21 (53.8%)	25 (64.1%)
Absent	16 (41.0%)	12 (30.8%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Oropharynx		
Present	16 (41.0%)	11 (28.2%)
Absent	21 (53.8%)	26 (66.7%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Hypopharynx		
Present	7 (17.9%)	7 (17.9%)
Absent	30 (76.9%)	30 (76.9%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Epiglottis		
Present	7 (17.9%)	3 (7.7%)
Absent	30 (76.9%)	34 (87.2%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Laryngeal Vestibule		
Present	0 (0%)	0 (0%)
Absent	37 (94.9%)	37 (94.9%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Vocal Folds		
Present	0 (0%)	0 (0%)
Absent	37 (94.9%)	37 (94.9%)
Missing	2 (5.1%)	2 (5.1%)
Bolus Location at Swallow Onset: Subglottis		
Absent	37 (94.9%)	37 (94.9%)
Missing	2 (5.1%)	2 (5.1%)

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Oropharyngeal Residue: Present vs. Absent		
Present	39 (100%)	39 (100%)
Oropharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	2.78 (2.01)	3.85 (5.64)
Median [Q1, Q3]	2.00 [1.50, 3.00]	2.00 [1.75, 3.25]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	5.00, 5.10, 6.30, 9.72	7.30, 10.1, 11.7, 25.7
Min, Max	1.00, 12.0	1.00, 35.0
Hypopharyngeal Residue: Present vs. Absent		
Absent	1 (2.6%)	0 (0%)
Present	38 (97.4%)	39 (100%)
Hypopharyngeal Residue: Amount When Present		
Mean (<i>SD</i>)	1.95 (1.14)	3.44 (9.98)
Median [Q1, Q3]	2.00 [1.00, 2.38]	1.50 [1.25, 2.25]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.15, 4.00, 4.15, 5.26	3.00, 3.55, 7.00, 41.2
Min, Max	1.00, 6.00	1.00, 64.0
Missing	1 (2.6%)	0 (0%)
Epiglottic Residue: Present vs. Absent		
Absent	18 (46.2%)	1 (2.6%)
Present	21 (53.8%)	38 (97.4%)
Epiglottic Residue: Amount When Present		
Mean (<i>SD</i>)	5.93 (8.15)	10.7 (13.2)
Median [Q1, Q3]	3.00 [2.00, 4.00]	5.00 [2.13, 12.3]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	1.50, 1.50, 1.93, 2.00
Percentiles: 90%, 95%, 97.5%, 99%	9.00, 28.0, 29.5, 30.4	33.1, 40.9, 46.2, 47.3
Min, Max	1.00, 31.0	1.50, 48.0
Missing	18 (46.2%)	1 (2.6%)
Laryngeal Vestibule Residue: Present vs. Absent		
Absent	29 (74.4%)	20 (51.3%)
Present	10 (25.6%)	19 (48.7%)
Laryngeal Vestibule Residue: Amount When Present		
Mean (<i>SD</i>)	6.90 (9.01)	9.87 (13.0)
Median [Q1, Q3]	4.00 [2.25, 5.50]	3.00 [2.00, 12.5]
Percentiles: 1%, 2.5%, 5%, 10%	1.09, 1.23, 1.45, 1.90	1.00, 1.00, 1.00, 1.40
Percentiles: 90%, 95%, 97.5%, 99%	13.9, 22.5, 26.7, 29.3	33.4, 35.7, 38.9, 40.7
Min, Max	1.00, 31.0	1.00, 42.0

	Green opaque (<i>N</i> = 39)	White coating (<i>N</i> = 39)
Missing	29 (74.4%)	20 (51.3%)
Vocal Fold Residue: Present vs. Absent		
Absent	37 (94.9%)	33 (84.6%)
Present	2 (5.1%)	6 (15.4%)
Vocal Fold Residue: Amount When Present		
Mean (<i>SD</i>)	9.00 (1.41)	19.8 (20.5)
Median [Q1, Q3]	9.00 [8.50, 9.50]	12.5 [4.38, 28.5]
Percentiles: 1%, 2.5%, 5%, 10%	8.02, 8.05, 8.10, 8.20	3.03, 3.06, 3.13, 3.25
Percentiles: 90%, 95%, 97.5%, 99%	9.80, 9.90, 9.95, 9.98	43.5, 49.3, 52.1, 53.9
Min, Max	8.00, 10.0	3.00, 55.0
Missing	37 (94.9%)	33 (84.6%)
Subglottic Residue: Present vs. Absent		
Absent	38 (97.4%)	38 (97.4%)
Present	1 (2.6%)	1 (2.6%)
Subglottic Residue: Amount When Present		
Mean (<i>SD</i>)	NA	NA
Median [Q1, Q3]	1.00 [1.00, 1.00]	10.0 [10.0, 10.0]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00	10.0, 10.0, 10.0, 10.0
Percentiles: 90%, 95%, 97.5%, 99%	1.00, 1.00, 1.00, 1.00	10.0, 10.0, 10.0, 10.0
Min, Max	1.00, 1.00	10.0, 10.0
Missing	38 (97.4%)	38 (97.4%)
PAS		
1	29 (74.4%)	19 (48.7%)
2	0 (0%)	0 (0%)
3	8 (20.5%)	14 (35.9%)
4	0 (0%)	0 (0%)
5	1 (2.6%)	5 (12.8%)
6	0 (0%)	0 (0%)
7	1 (2.6%)	0 (0%)
8	0 (0%)	1 (2.6%)

Swallow Condition: 90 mL of Thin Liquid via Cup, Uninterrupted Sequential Swallows

	White coating (N = 39)
Number of Swallows	
1	2 (5.1%)
2	1 (2.6%)
3	3 (7.7%)
4	6 (15.4%)
5	8 (20.5%)
6	2 (5.1%)
7	5 (12.8%)
8	3 (7.7%)
9	3 (7.7%)
11	2 (5.1%)
13	2 (5.1%)
14	2 (5.1%)
Bolus Location at Swallow Onset: Oral Cavity Only	
Present	24 (61.5%)
Absent	13 (33.3%)
Missing	2 (5.1%)
Bolus Location at Swallow Onset: Oropharynx	
Present	11 (28.2%)
Absent	26 (66.7%)
Missing	2 (5.1%)
Bolus Location at Swallow Onset: Hypopharynx	
Present	5 (12.8%)
Absent	32 (82.1%)
Missing	2 (5.1%)
Bolus Location at Swallow Onset: Epiglottis	
Present	1 (2.6%)
Absent	36 (92.3%)
Missing	2 (5.1%)
Bolus Location at Swallow Onset: Laryngeal Vestibule	
Present	1 (2.6%)
Absent	36 (92.3%)
Missing	2 (5.1%)
Bolus Location at Swallow Onset: Vocal Folds	
Present	0 (0%)
Absent	37 (94.9%)
Missing	2 (5.1%)

	White coating (<i>N</i> = 39)
Bolus Location at Swallow Onset: Subglottis	
Absent	37 (94.9%)
Missing	2 (5.1%)
Oropharyngeal Residue: Present vs. Absent	
Present	39 (100%)
Oropharyngeal Residue: Amount When Present	
Mean (<i>SD</i>)	2.35 (1.22)
Median [Q1, Q3]	2.00 [1.50, 3.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.50, 4.20, 6.00, 6.00
Min, Max	1.00, 6.00
Hypopharyngeal Residue: Present vs. Absent	
Present	39 (100%)
Hypopharyngeal Residue: Amount When Present	
Mean (<i>SD</i>)	1.87 (0.723)
Median [Q1, Q3]	2.00 [1.25, 2.50]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	2.60, 3.00, 3.05, 3.62
Min, Max	1.00, 4.00
Epiglottic Residue: Present vs. Absent	
Absent	1 (2.6%)
Present	38 (97.4%)
Epiglottic Residue: Amount When Present	
Mean (<i>SD</i>)	7.42 (12.6)
Median [Q1, Q3]	3.00 [2.00, 6.88]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.35
Percentiles: 90%, 95%, 97.5%, 99%	14.9, 21.3, 42.3, 58.9
Min, Max	1.00, 70.0
Missing	1 (2.6%)
Laryngeal Vestibule Residue: Present vs. Absent	
Absent	19 (48.7%)
Present	20 (51.3%)
Laryngeal Vestibule Residue: Amount When Present	
Mean (<i>SD</i>)	4.85 (8.52)
Median [Q1, Q3]	2.75 [2.00, 3.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.45
Percentiles: 90%, 95%, 97.5%, 99%	8.10, 10.6, 25.3, 34.1

	White coating (<i>N</i> = 39)
Min, Max	1.00, 40.0
Missing	19 (48.7%)
Vocal Fold Residue: Present vs. Absent	
Absent	33 (84.6%)
Present	6 (15.4%)
Vocal Fold Residue: Amount When Present	
Mean (<i>SD</i>)	8.42 (15.5)
Median [Q1, Q3]	2.25 [2.00, 2.88]
Percentiles: 1%, 2.5%, 5%, 10%	1.05, 1.13, 1.25, 1.50
Percentiles: 90%, 95%, 97.5%, 99%	21.5, 30.8, 35.4, 38.2
Min, Max	1.00, 40.0
Missing	33 (84.6%)
Subglottic Residue: Present vs. Absent	
Absent	38 (97.4%)
Present	1 (2.6%)
Subglottic Residue: Amount When Present	
Mean (<i>SD</i>)	NA
Median [Q1, Q3]	24.0 [24.0, 24.0]
Percentiles: 1%, 2.5%, 5%, 10%	24.0, 24.0, 24.0, 24.0
Percentiles: 90%, 95%, 97.5%, 99%	24.0, 24.0, 24.0, 24.0
Min, Max	24.0, 24.0
Missing	38 (97.4%)
PAS	
1	17 (43.6%)
2	2 (5.1%)
3	14 (35.9%)
4	0 (0%)
5	5 (12.8%)
6	0 (0%)
7	1 (2.6%)
8	0 (0%)

Swallow Condition: 5 mL of Blue Pudding via Spoon, Single Swallow

	Blue opaque (N = 77)
Number of Swallows	
1	64 (83.1%)
2	12 (15.6%)
3	1 (1.3%)
Bolus Location at Swallow Onset: Oral Cavity Only	
Present	39 (50.6%)
Absent	37 (48.1%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Oropharynx	
Present	35 (45.5%)
Absent	41 (53.2%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Hypopharynx	
Present	4 (5.2%)
Absent	71 (92.2%)
Missing	2 (2.6%)
Bolus Location at Swallow Onset: Epiglottis	
Present	10 (13.0%)
Absent	66 (85.7%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Laryngeal Vestibule	
Present	1 (1.3%)
Absent	75 (97.4%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Vocal Folds	
Present	0 (0%)
Absent	76 (98.7%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Subglottis	
Absent	76 (98.7%)
Missing	1 (1.3%)
Oropharyngeal Residue: Present vs. Absent	
Absent	6 (7.8%)
Present	71 (92.2%)
Oropharyngeal Residue: Amount When Present	
Mean (SD)	5.37 (11.0)
Median [Q1, Q3]	3.00 [2.00, 4.75]

	Blue opaque (<i>N</i> = 77)
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	7.50, 11.8, 19.8, 50.5
Min, Max	1.00, 89.0
Missing	6 (7.8%)
Hypopharyngeal Residue: Present vs. Absent	
Absent	18 (23.4%)
Present	59 (76.6%)
Hypopharyngeal Residue: Amount When Present	
Mean (<i>SD</i>)	2.04 (2.68)
Median [Q1, Q3]	1.50 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	3.00, 4.00, 5.10, 12.3
Min, Max	1.00, 21.0
Missing	18 (23.4%)
Epiglottic Residue: Present vs. Absent	
Absent	44 (57.1%)
Present	33 (42.9%)
Epiglottic Residue: Amount When Present	
Mean (<i>SD</i>)	6.14 (7.64)
Median [Q1, Q3]	4.00 [2.50, 6.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.16, 1.40, 1.50, 2.00
Percentiles: 90%, 95%, 97.5%, 99%	11.0, 16.3, 26.0, 35.6
Min, Max	1.00, 42.0
Missing	44 (57.1%)
Laryngeal Vestibule Residue: Present vs. Absent	
Absent	77 (100%)
Laryngeal Vestibule Residue: Amount When Present	
Mean (<i>SD</i>)	NA
Median [Q1, Q3]	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA
Min, Max	NA
Missing	77 (100%)
Vocal Fold Residue: Present vs. Absent	
Absent	77 (100%)
Vocal Fold Residue: Amount When Present	
Mean (<i>SD</i>)	NA

	Blue opaque (<i>N</i> = 77)
Median [Q1, Q3]	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA
Min, Max	NA
Missing	77 (100%)
Subglottic Residue: Present vs. Absent	
Absent	77 (100%)
Subglottic Residue: Amount When Present	
Mean (<i>SD</i>)	NA
Median [Q1, Q3]	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA
Min, Max	NA
Missing	77 (100%)
PAS	
1	76 (98.7%)
2	1 (1.3%)
3	0 (0%)
4	0 (0%)
5	0 (0%)
6	0 (0%)
7	0 (0%)
8	0 (0%)

Swallow Condition: Self-Selected Volume of Cracker, Single Swallow

	Natural/non-colored (<i>N</i> = 78)
Bite Size (grams)	
Mean (<i>SD</i>)	1.33 (0.722)
Median [Q1, Q3]	1.05 [0.809, 1.58]
Min, Max	0.440, 3.09
Number of Swallows	
1	65 (83.3%)
2	10 (12.8%)
3	3 (3.8%)
Bolus Location at Swallow Onset: Oral Cavity Only	
Present	32 (41.0%)
Absent	46 (59.0%)
Bolus Location at Swallow Onset: Oropharynx	
Present	46 (59.0%)
Absent	32 (41.0%)
Bolus Location at Swallow Onset: Hypopharynx	
Present	5 (6.4%)
Absent	72 (92.3%)
Missing	1 (1.3%)
Bolus Location at Swallow Onset: Epiglottis	
Present	13 (16.7%)
Absent	65 (83.3%)
Bolus Location at Swallow Onset: Laryngeal Vestibule	
Present	0 (0%)
Absent	78 (100%)
Bolus Location at Swallow Onset: Vocal Folds	
Present	0 (0%)
Absent	78 (100%)
Bolus Location at Swallow Onset: Subglottis	
Absent	78 (100%)
Oropharyngeal Residue: Present vs. Absent	
Absent	22 (28.2%)
Present	56 (71.8%)
Oropharyngeal Residue: Amount When Present	
Mean (<i>SD</i>)	3.19 (5.01)
Median [Q1, Q3]	2.00 [1.38, 3.63]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	5.25, 6.13, 6.81, 21.0

	Natural/non-colored (<i>N</i> = 78)
Min, Max	1.00, 38.0
Missing	22 (28.2%)
Hypopharyngeal Residue: Present vs. Absent	
Absent	45 (57.7%)
Present	33 (42.3%)
Hypopharyngeal Residue: Amount When Present	
Mean (<i>SD</i>)	1.55 (0.617)
Median [Q1, Q3]	1.50 [1.00, 2.00]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	2.00, 2.70, 3.10, 3.34
Min, Max	1.00, 3.50
Missing	45 (57.7%)
Epiglottic Residue: Present vs. Absent	
Absent	64 (82.1%)
Present	14 (17.9%)
Epiglottic Residue: Amount When Present	
Mean (<i>SD</i>)	3.93 (4.32)
Median [Q1, Q3]	2.50 [1.00, 4.50]
Percentiles: 1%, 2.5%, 5%, 10%	1.00, 1.00, 1.00, 1.00
Percentiles: 90%, 95%, 97.5%, 99%	9.90, 13.1, 14.0, 14.6
Min, Max	1.00, 15.0
Missing	64 (82.1%)
Laryngeal Vestibule Residue: Present vs. Absent	
Absent	78 (100%)
Laryngeal Vestibule Residue: Amount When Present	
Mean (<i>SD</i>)	NA
Median [Q1, Q3]	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA
Percentiles: 90%, 95%, 97.5%, 99%	NA
Min, Max	NA
Missing	78 (100%)
Vocal Fold Residue: Present vs. Absent	
Absent	78 (100%)
Vocal Fold Residue: Amount When Present	
Mean (<i>SD</i>)	NA
Median [Q1, Q3]	NA
Percentiles: 1%, 2.5%, 5%, 10%	NA

Natural/non-colored (<i>N</i> = 78)	
PAS	
1	78 (100%)
2	0 (0%)
3	0 (0%)
4	0 (0%)
5	0 (0%)
6	0 (0%)
7	0 (0%)
8	0 (0%)