

SINGLE-USE ENDOSCOPY FOR THE EVALUATION OF SWALLOWING (FEES)



Authors: Christina Cool MPH¹, Ben Brody¹, Jason Cronwall MBA¹, Christian Escobar¹, Jacqueline Mojica MS CCC-SLP²
[1] Ambu USA, [2] NYU Langone Medical Center

INTRODUCTION

Single-use endoscopy was first introduced in 2009, with the first single-use flexible rhinolaryngoscope available in 2019. While single-use has become of interest across a multitude of procedure types given the risk of cross-contamination, the performance capability of a single-use scope has not formally been evaluated for the FEES (Fiberoptic endoscopic evaluation of swallowing) indication – a frequently performed procedure across various settings, where timely reprocessing and/or sterilization may not always be feasible.

OBJECTIVE

Primary Objective: The primary objective of this study was to measure procedural success, meaning the ability to perform the procedure without the use of a secondary endoscope.

Secondary Objective: The secondary objective was to evaluate the overall performance and usability of the single-use rhinolaryngoscope and monitor.

METHODS

- A total of 24 speech language pathologist (SLP)s from 16 sites were identified to participate in this study.
- Facilities included represent a national sample including facilities in Alabama, Colorado, Kentucky, Maryland, Nevada, New York, Pennsylvania, Virginia, Texas, and Washington DC.
- Setting clinicians worked across long term acute care facilities, academic and non-academic medical centers
- Each of the clinicians had performed a FEES exam with the Ambu aScope™ 4 Rhinolaryngo Slim and the aView™ 2 Advance monitor (i.e. single-use rhinolaryngoscope and monitor). Of the 24 clinicians, one was a student and results are presented with and without their inclusion. The student did not perform a procedure and was not included in the primary outcome.
- Once Clinicians completed a FEES exam, a survey with a five-point rating system to quantify the product performance from Unacceptable (1) to Excellent (5) was given.
 - This survey included various performance characteristics including ease of use, overall quality/functionality, look and feel of the scope, ease of insertion/airway inspection, bending capabilities/maneuverability, stiffness of insertion cord, image quality and monitor performance, single-use concept, accessibility/convenience and overall performance.
 - Once the data were complete, simple averages were calculated for each of the variables included in the survey. For summary and presentation purpose, ratings of 4 and 5 were considered excellent, 2 and 3, acceptable and 1 as non-acceptable.

RESULTS

- Of the 23 clinicians who had performed a FEES evaluation with a single-use rhinolaryngoscope and monitor 23/23 completed procedure(s) without the use of a secondary scope, resulting in **100% procedural success**.

Results from the survey can be found in Figure 1

- The overall rating of the single-use rhinolaryngoscope and monitor was 4.6 with 100% of participants rating the scope performance as excellent.
- 100% of those who used the scope for a FEES procedure found the scope to be excellent. In addition to overall rating, ease of use (4.8), ease of insertion/airway inspection (4.8), bending capability/maneuverability (4.8), single-use concept/no cross-contamination risk (5.0), and accessibility/convenience/speed of setting up (5.0), were all rated as excellent with 100% of respondents rating these variables as either a 4 or a 5.
- Overall quality and functionality as well as look and feel were both rated excellent by 95% of participants (4.4 and 4.7, respectively).
- Both stiffness of insertion cord (4.5) and Image quality and monitor performance (4.2) were rated as excellent by 90% of participants.



Figure 1

Attribute	Overall Rating	Excellent	Acceptable	Less than acceptable
Ease of Use	4.8	100% (23/23)	-	-
Overall quality & functionality	4.4	95% (22/23)	5% (1/23)	-
Look and feel	4.7	95% (22/23)	5% (1/23)	-
Ease of insertion/airway inspection	4.8	100% (23/23)	-	-
Bending capability/maneuverability	4.8	100% (23/23)	-	-
Stiffness of insertion cord	4.5	90% (21/23)	10% (2/23)	-
Image quality and monitor performance	4.2	90% (21/23)	10% (2/23)	-
Single-use concepts/no cross-contamination risk	5.0	100% (23/23)	-	-
Accessibility/convenience/speed of setting up	5.0	100% (23/23)	-	-
Overall performance (n-23)	4.6	100% (23/23)	-	-
Overall performance (n-24)*	4.6	100% (24/24)	-	-

*Note: the student only completed ratings for Ease of Use, Overall Quality and Functionality. With the inclusions of their rating for these 3 categories the overall ratings remained the same.

DISCUSSION

- The introduction of single-use endoscopes for use in FEES procedures could play a key role in keeping up with the growing demand¹
- SLPs and clinicians who utilize single-use endoscopes are enabled to take the procedure to the patient at any time, without being limited to specific procedure rooms with stationary endoscopy equipment, worrying about delays due to endoscope reprocessing, or having to transport burdensome endoscopy towers throughout the hospital.
- In addition to the ease and availability of the single-use scope, the portable high powered display allows for necessary and required recording and documentation, further demonstrating the added compatibility and ease in utilizing single-use scopes for these procedures.
- Physicians and SLPs exploring the expansion of their FEES procedures or the option of developing a mobile FEES department or capability should evaluate the annual FEES case load and various procedure settings to gain a better understanding of the respective costs.

LIMITATIONS

- The cost to perform a FEES procedure will vary across facilities and mobile clinics. In one recent study, a single reusable flexible nasopharyngolaryngoscope and digital video tower with components amounted to more than \$33,000² alone, without including the costs of repairs or reprocessing annually.
- A full investigation evaluating timestamps for procedure duration, transportation, set up, and annual patient throughput should be captured to accurately measure the magnitude of impact that single-use rhinolaryngoscopes may have on FEES case loads.

CONCLUSION

SLPs successfully completed 100% of the FEES procedures with single-use rhinolaryngoscopes.

The scopes received a high overall rating and scores across each performance measure in the survey, demonstrating that single-use rhinolaryngoscopes can be utilized for FEES procedures.

By eliminating the availability and portability concerns of traditional endoscopy equipment and possessing the documentation capabilities required for FEES, single-use rhinolaryngoscopes can meet the growing demand of FEES procedures and create a streamlined workflow for SLPs and clinicians.

A faster, more mobile procedure design could assist in the expansion of FEES into more diagnostic areas, such as an ENT indication for assessing Laryngopharyngeal Reflux (LPR) or for patient assessment for discharge after extubation.¹

Single-use rhinolaryngoscopes were shown to successfully complete FEES procedures, and may provide significant cost and workflow benefits for clinicians across multiple settings as the demand and utilization of FEES continues to grow.

1. Langmore, S. E., Scarborough, D. R., Kelchner, L. N., Swigert, N. B., Murray, J., Reece, S., Cavanagh, T., Harrigan, L. C., Scheel, R., Gosa, M. M., & Rule, D. K. (2022). Tutorial on clinical practice for use of the fiberoptic endoscopic evaluation of swallowing procedure with adult populations: Part 1. American Journal of Speech-Language Pathology, 31(1), 163-187.
2. Walczak, R., Arnold, M., Grewal, J., Yuan, X., Suryadevara, A., & Marzouk, H. (2020). Reusable vs disposable nasopharyngolaryngoscopes: Cost analysis and resident survey. Laryngoscope Investigative Otolaryngology, 6(1), 88-93. <https://doi.org/10.1002/lto2.500>.