Scoring the Penetration-Aspiration Scale (PAS) in Two Conditions: A Reliability Study

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INTRODUCTION

The Penetration-Aspiration Scale (PAS) is a widely applied metric for identifying and rating the severity of airway invasion events. PAS scores are often included as a primary outcome measure in clinical interventional studies, applied to characterize airway protection in a disease, or used as determinants or predictors of clinical outcomes. Despite the widespread use of the PAS, there is variability in scoring conditions. Some research studies score each swallow task within the course of a Modified Barium Swallow Study (MBSS) of the same patient, while others score randomized single swallow tasks from multiple patient MBSSs blinded to swallowing performance that precedes or follows the targeted swallow task. The potential effects of different scoring conditions (e.g., blinding) on PAS scoring have not been studied and may have high relevance for the conclusion drawn from the result.

Aim: The current pilot investigation is to determine the impact of two common PAS scoring conditions on rater reliability and accuracy: **1. Contextual**, unblinded scoring condition and **2. Randomized**, blinded condition.

METHODS

Participants:
Seven graduate students participated as *student raters*. Four certified Speech Language Pathologists (SLPs) participated as *clinician raters*, and Two clinical researchers participated as *gold standard raters.*

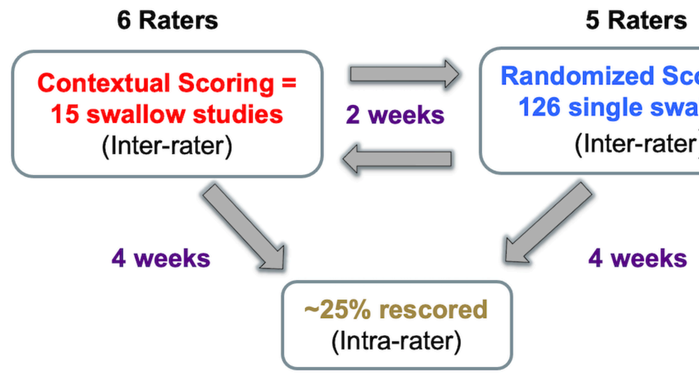
Material:
MBSS digital recordings from 15 heterogeneous patients using the MBSImP protocol were retrospectively selected and used to develop the two scoring conditions:

1) *Contextual Scoring Condition:*
MBSS digitized records were de-identified and converted from DICOM into AVI format.

2) Randomized Scoring Condition:
All MBSS records were trimmed into single swallow trials (n= 126). Each single swallow trial was assigned a unique code to blind raters from each patient's swallow performance on the full MBSS.

Procedure:

N = 11 (7 student raters, 4 clinician raters)



- To assess score *accuracy*, the two gold standard raters scored all MBSS records in both scoring conditions. Raters' PAS scores in each scoring condition were compared to the gold standard scores.

RESULTS

	Student Raters (N = 7)		
Scoring Condition	Inter-rater Reliability	Intra-rater Reliability (Mean)	Accuracy (Mean)
Contextual	0.55 CI= 0.45 – 0.65	0.73	0.69
Randomized	0.67 CI= 0.60 – 0.74	0.76	0.74

	Clinician Raters (N = 4)		
Scoring Condition	Inter-rater Reliability	Intra-rater Reliability (Mean)	Accuracy (Mean)
Contextual	0.70 CI= 0.57 - 0.80	0.80	0.78
Randomized	0.70 CI= 0.58 - 0.79	0.86	0.76

Intraclass Correlation Coefficient (ICC) statistics were used to determine inter- and intra-rater reliability and PAS score accuracy. ICC estimates and their 95% confidence intervals (CIs) were calculated using R software (version 3.5.2)

CONCLUSION

In this pilot investigation, no statistically significant differences in PAS rater reliability and score accuracy were found between the two scoring conditions. If findings from this pilot study are reproduced in larger sample sizes, the time and intensity involved in splicing and randomizing MBSS for scoring may not be necessary.

SELECTED REFERENCES

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