



Interdisciplinary Evaluation of Pediatric Airway Assessment Using Brodsky and Mallampati Classifications



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Background

- Accurate assessment of the pediatric airway is critical to ensuring safe sedation practices; however, variability in the interpretation of Brodsky and Mallampati classifications remains a concern.
- The Brodsky classification has demonstrated greater reliability, particularly when used by trained clinicians, whereas the Mallampati classification shows lower consistency, especially in younger or uncooperative patients.
- This study investigated interrater and intrarater agreement among pediatric dentistry residents, dental faculty, and anesthesiology faculty to identify potential gaps in training and improve the reliability of airway evaluations.

Objectives & Hypotheses

Objectives:

- To assess the agreement between raters in classifying airway obstructions using the Brodsky and Mallampati classifications and in making sedation decisions
- To evaluate the consistency of individual raters over time in their sedation decisions
- To evaluate how clinical experience and training influence the accuracy and consistency of evaluations using the Brodsky and Mallampati classifications
- To identify areas where training can be recommended to improve the reliability of pediatric oral airway assessments across professional groups

H₀₁ : There is no significant difference in interrater agreement and reliability among pediatric dentistry residents, pediatric dental faculty, and anesthesiology faculty when using the Brodsky and Mallampati classifications to assess airway obstructions.

H₀₂ There is no significant difference in the consistency of individual raters over time in their sedation decisions.

Methods

- This IRB-approved cross-sectional study was conducted at the University of Illinois Chicago and included 50 clinicians (10 first-year and 12 second-year pediatric dental residents, 15 pediatric dental faculty, and 13 anesthesiology faculty), all of whom regularly perform pediatric airway assessments.
- Participants completed an electronic questionnaire that gathered background information and presented 17 pediatric airway videos. For each video, they evaluated the airway using the Brodsky and Mallampati classifications and made a binary decision on the appropriateness of oral moderate sedation.
- The Brodsky scale assessed tonsillar obstruction (Grades 1–4), while the Mallampati classification evaluated oropharyngeal visibility (Classes I–IV).
- All videos were standardized in setup and selected to represent a full spectrum of airway presentations.
- A follow-up survey, identical to the first, was administered seven days later to assess consistency in responses over time (intrarater reliability).
- Data were analyzed using SPSS. Interrater agreement was measured with Kendall's W and Fleiss' Kappa; reliability was assessed with Intraclass Correlation Coefficients (ICCs). Group differences in consistency were evaluated using Kruskal-Wallis and Wilcoxon rank-sum tests, with significance set at $p < 0.05$.



Figure 1. A compilation of still images from the study videos, presented as examples of the variations in assessed airways.

Results

Brodsky Classification Reliability

- Inter-rater reliability was moderate to high across groups:
 - Anesthesiology faculty demonstrated the highest agreement (ICC = 0.627–0.612)
 - Dental faculty improved significantly over time (ICC = 0.587 → 0.654)
 - Residents showed moderate agreement (ICC = 0.578–0.536) with minimal improvement

Mallampati Classification Reliability

- Inter-rater reliability was lower across all groups:
 - Anesthesiology faculty started with moderate reliability (ICC = 0.365) but declined in the second survey (ICC = 0.209)
 - Dental faculty and residents showed consistently low reliability and high variability

Sedation Decision Agreement

- Overall moderate agreement:
 - Anesthesiology faculty: Fleiss' Kappa = 0.467
 - Dental faculty: Fleiss' Kappa = 0.407
 - Residents had the lowest consistency over time

Intra-Rater Reliability (Consistency of Individual Participants)

- Anesthesiology faculty demonstrated the highest consistency (Mean = 15.6, SD = 2.07)
- Dental faculty had moderate consistency (Mean = 14.62, SD = 1.98)
- Residents had the lowest intra-rater reliability (Mean = 13.05, SD = 2.24)
- Statistical Significance: The Kruskal-Wallis test ($p = 0.009$) revealed that anesthesiology faculty were significantly more consistent than residents

Discrepancies in Airway Assessments

- Brodsky Classification: Anesthesiology faculty showed the least variability
- Mallampati Classification: Residents displayed the highest variability (Mean Discrepancy = 8.59)
- Statistical Significance: Kruskal-Wallis test ($p = 0.0277$) showed significant differences in Mallampati reliability across groups

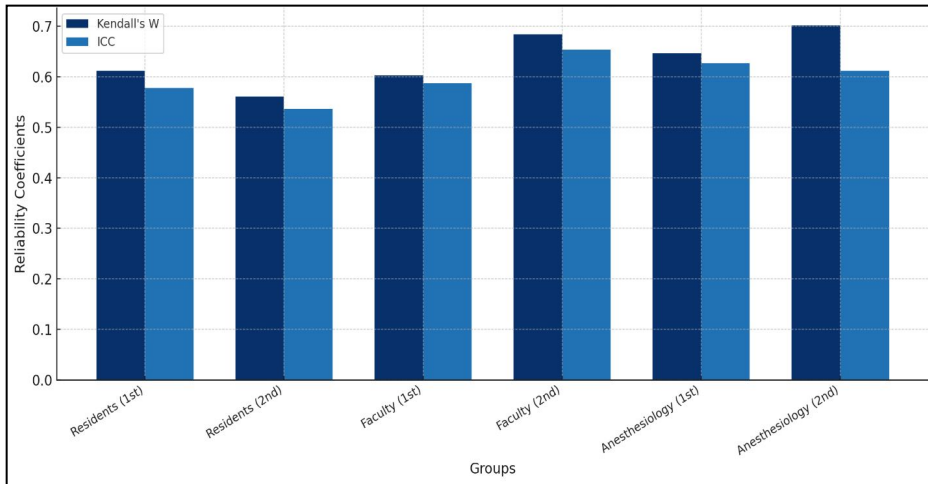


Figure 2 Reliability of Brodsky Classification Assessments Across Professional Groups and Survey Phases

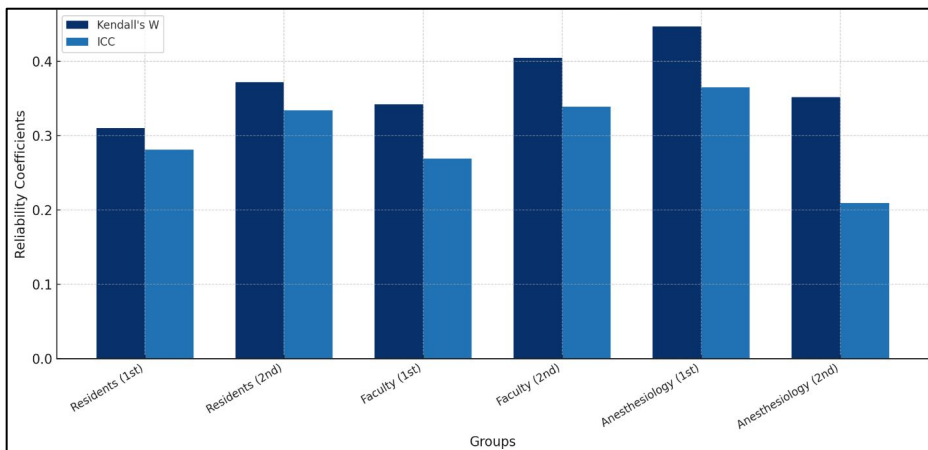


Figure 3. Reliability of Mallampati Classification Assessments Across Professional Groups and Survey Phases

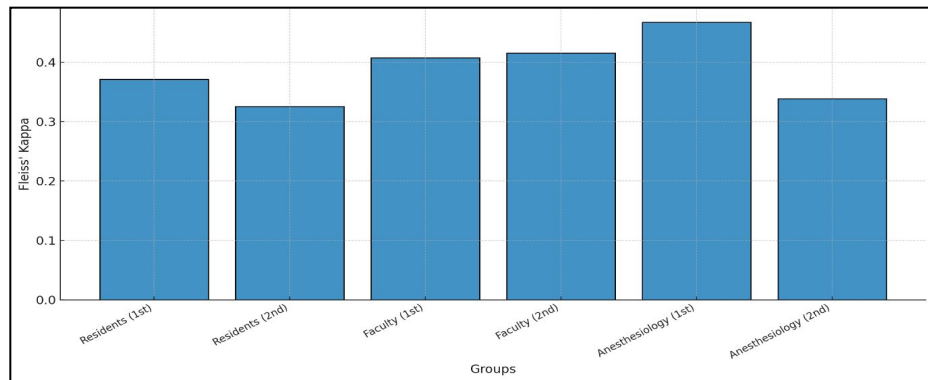


Figure 4. Sedation Decision Reliability

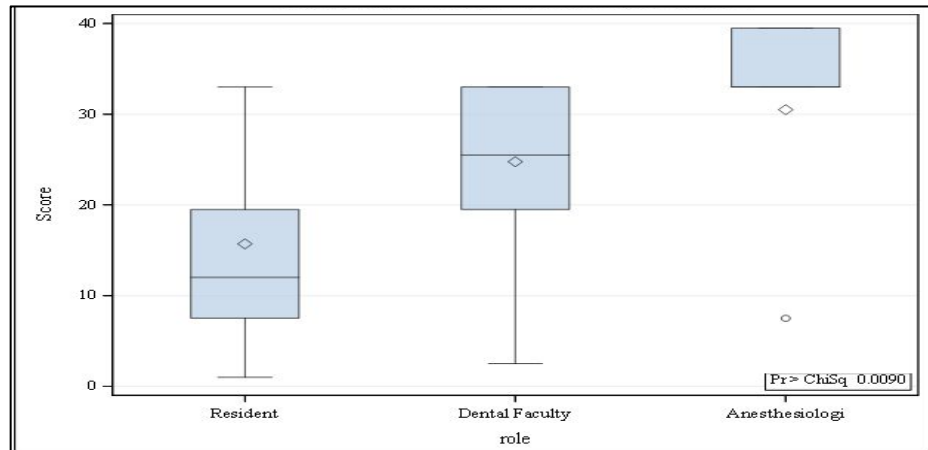


Figure 5. Boxplot of Wilcoxon Scores for Intra-Rater Reliability across Professional Groups

Conclusions

From the results of this study, the following conclusions can be made:

- The Brodsky classification was more reliable than the Mallampati classification, particularly among anesthesiology and pediatric dental faculty.
- Pediatric dentistry residents showed moderate reliability with limited improvement over time, highlighting the need for additional training.
- The Mallampati classification showed high variability across all groups, making it less reliable for pediatric airway assessment.
- Sedation decisions had moderate agreement, with the anesthesiology faculty being the most consistent and residents the least.
- Standardized training and clearer guidelines are needed to improve airway assessments and sedation decision-making in pediatric dentistry.

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