

# Assessment of Airway Intervention Scoring During Pediatric Dental Sedation

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## Introduction

University Pediatric Dentistry (UPD) offers several levels of dental sedation: oral moderate, intranasal moderate, intravenous moderate, and deep intravenous sedation. An Airway Intervention Score is used to rate the required airway interventions from 10 (no intervention) to 1 (required intubation) during sedation appointments (Figure 1).

Figure 1

AIRWAY INTERVENTION SCORE: OVERALL ASSESSMENT		PLEASE CIRCLE OVERALL AIRWAY SCORE	
1A	CASE CANCELLED DUE TO AIRWAY, or ETT / LMA USE REQUIRED	6A	OXYGEN SUPPLEMENTATION INCREASED (5L+), ≥50 %O2, or REPEATED CHIN LIFT, or REMOVAL OF INTRAORAL DEVICE (BB, PROP, GAUZE, ISOLITE)
2A	BMV REQUIRED, or REVERSAL AGENTS, or SUX FOR SPASM, or CASE INCOMPLETE DUE TO AIRWAY	7A	INTERMITTANT CHIN LIFT, or DEEPER SEDATION FOR COUGH, or ADJUSTMENT OF INTRAORAL DEVICE (BB, PROP, GAUZE, ISOLITE)
3A	ORAL or NASAL AIRWAY	8A	OXYGEN SUPPLEMENTATION INCREASED (3L+), ≥30% O2, or ADDITION OF O2, or HEAD REPOSITIONED or GLYCOPYRROLATE FOR COUGHING, or PAINFUL STIMULATION REQUIRED
4A	TONGUE PULL, or REPEATED JAW THRUSTS	9A	SUCTION FOR COUGHING, or MILD STIMULATION REQUIRED
5A	JAW THRUST REQUIRED, or FURTHER ADDITIONAL OXYGEN (10L+), 100% O2, or DEEPER SEDATION SPASM, or PROCEDURE INTERRUPTED FOR ANY AIRWAY MANEUVER,	10A	NO AIRWAY ISSUES, EITHER NO O2 (PO) or NC/ETCO2 O2 2L/MIN

This prospective observational study assessed the Airway Intervention Score used at UPD and examined how its values relate to sedation levels achieved during pediatric dental procedures. The first phase of this study evaluated interrater reliability of airway score for dental sedation procedures and showed a Spearman Rank R of 0.97 and Weighted Cohen Kappa of 0.98. This prospective observational study used a modified version of the Pediatric Sedation Airway Score in which several categories were updated, and a structured matrix was added with the goal of improved results for interrater reliability (Figure 2).

Figure 2

DATA 1: COMPONENTS OF AIRWAY SCORE		PLEASE CIRCLE ALL RELEVANT ASSESSMENT ITEMS For EACH COMPONENT			
WHAT COMPONENTS ARE PART OF THIS AIRWAY ASSESSMENT TOOL	D	E	F	G	H
1) OXYGEN USE	NONE / 2L NC	ADDED	3-5L or ≥ 30% O2	6-10L ≥ 50% O2	10L+ 100 % O2
2) CHIN / JAW MANEUVERS	NONE	OCCASIONAL CHIN LIFT	CONSTANT CHIN LIFT	OCCASIONAL JAW THRUST	CONSTANT JAW THRUST
3) PROCEDURE COMPLETION	NO ISSUES	MILD DELAY	INTERRUPTED FOR AIRWAY	INCOMPLETE	CANCELLED
4) COUGH MANAGEMENT	NO COUGH	NO INTERVENTION	SUCTION	GLYCOPYPYROLATE	EXTRA SEDATION
5) INTRAORAL DEVICES	NO ISSUES	ADJUST	CHANGE	REMOVE	CAUSE LARNGOSPASM
6) AIRWAY MANEUVRES	NONE	REPOSITION HEAD	TONGUE PULL	ORAL / NASAL AIRWAY	ETT / LMA
7) SEDATIVE USE AND AIRWAY	NONE	STIMULATION REQUIRED	SEDATION FOR COUGHING	SEDATION FOR LARYNGOSPASM	REVERSAL

Our modified rubric provides a structured assessment plan, incorporating amount of oxygen used, positioning maneuvers, degree of procedural completion, cough management, use of intraoral device(s), variations in sedative use, and over-sedation criteria. This study was conducted concurrently with a Prospective Assessment of a Procedure Behavior Score During Pediatric Dental Sedation.

## Methods

This prospective observational study was approved by the University at Buffalo Institutional Review Board. Patients between the ages of 3 and 17 (inclusive) were recruited as a convenience sample. After parental consent and assent if indicated, the Pediatric Sedation Airway Score form was completed by the sedation resident/nurse and the operating dentist, with raters blinded to one another’s assessment. Patient demographics, Airway Intervention Scores, procedural details and sedative use were recorded. Data was then entered into an Excel spreadsheet, and a comparative data analysis was performed.

## Results

Data collection and analysis has occurred for 128 patients to date (Table 1) for a variety of dental procedures under oral moderate sedation and deep IV sedation.

Table 1. Demographics, All Patients	Average / Median	SD / Range
Age (Years)	9.3	4.3
Weight (kg)	40.9	22.9
ASA	1	1 to 2
Mallampati	1	1 to 4
Tonsil	1	0 to 3
Asthma Percentage (%)	14.0	-

The Pediatric Sedation Airway Scores ranged from 4 and 10 (Figure 3). The Spearman Rank Correlation was used to determine the strength of the relationship between assessors. Interrater reliability was found to be R of 0.981 (Figure 4). The degree of disagreement between the raters was evaluated using a Linear Weighted Cohen Kappa to assess the consistency of scores between the raters. The Weighted Cohen Kappa was 0.956.

Figure 3

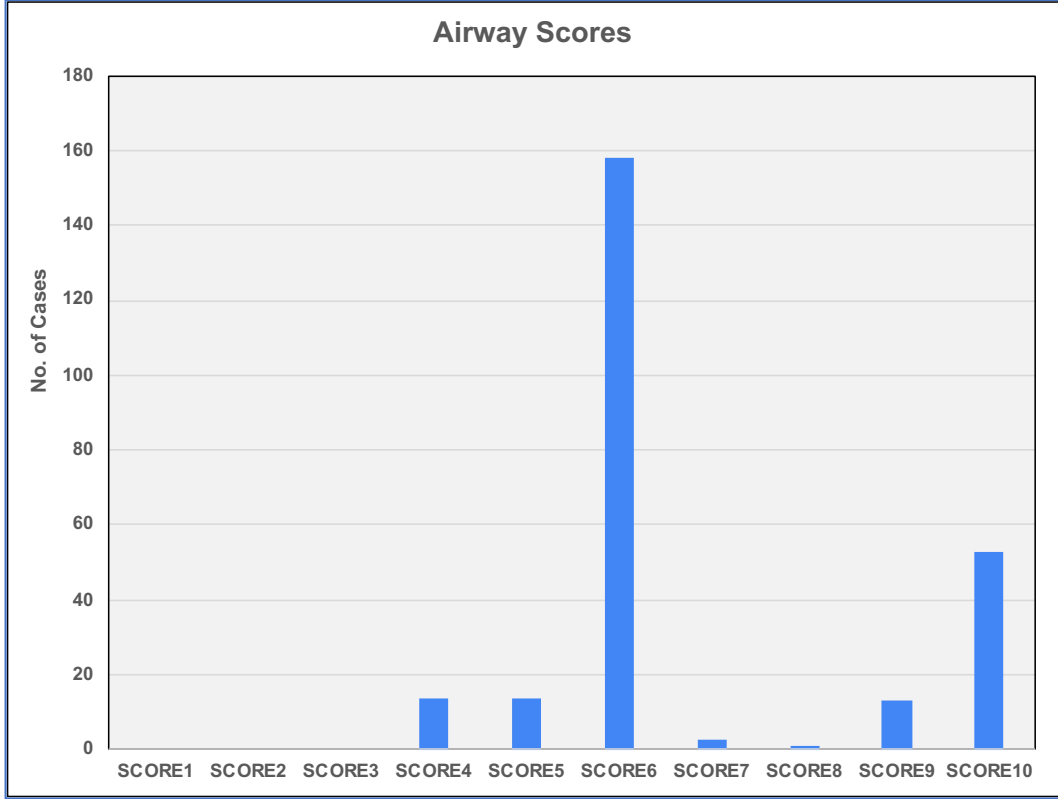
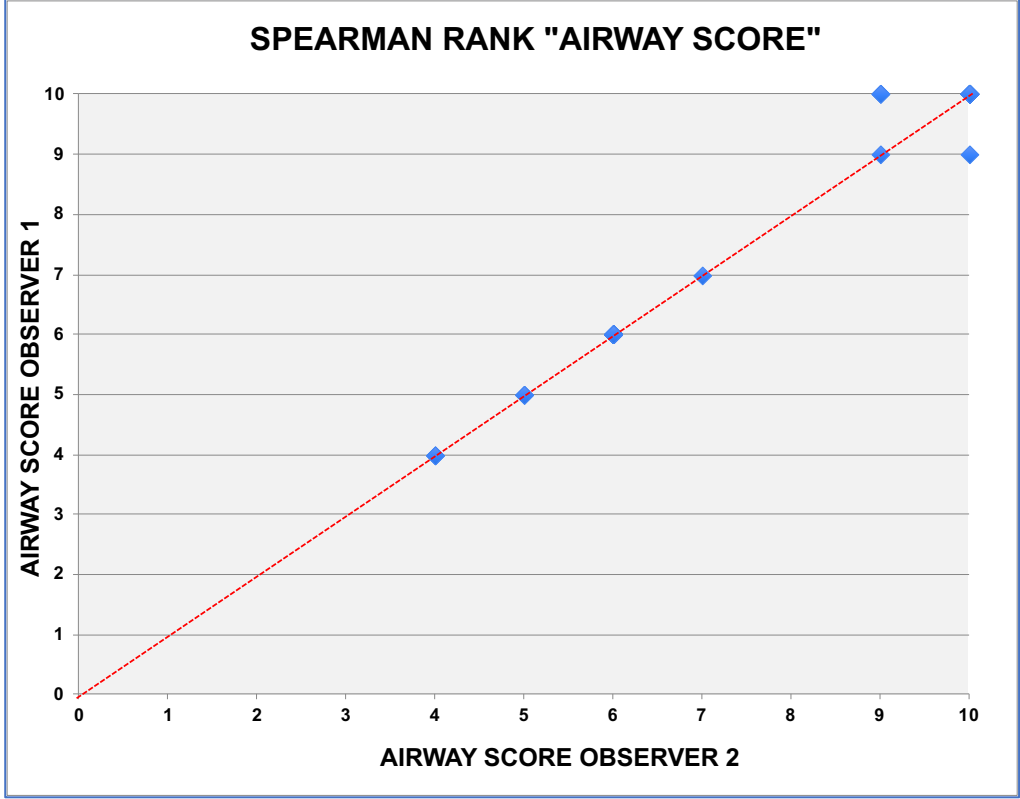


Figure 4



Review of the individual components of the scoring matrix demonstrates interrater agreement between the individual components ranging from 87.5 to 96.9%. The median agreement percentage for individual assessments were high, between 96.1 to 99.2 (Figure 5), range of agreement for each assessment variable (D-H) is also shown. The components scores were often significantly associated with the overall airway score (Figure 6), except for sedative use and adjustment of intra-oral devices.

Figure 5

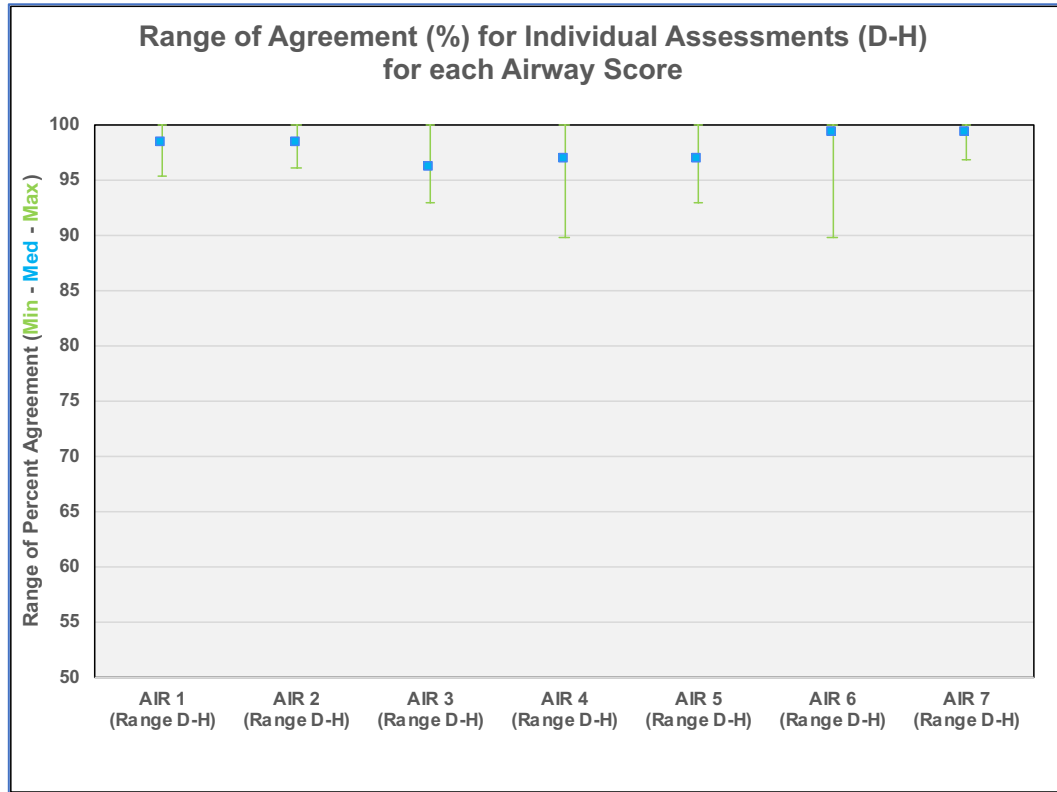
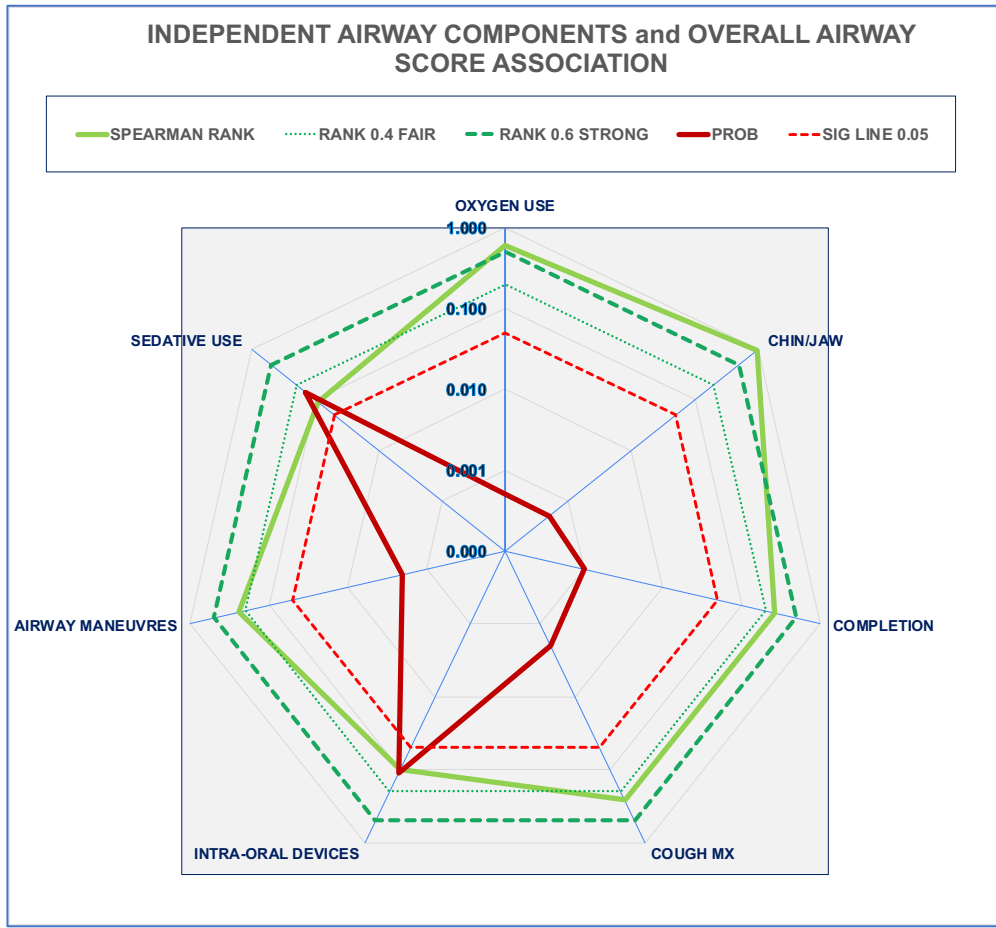


Figure 6



## Discussion

- The value of the Weighted Cohen’s Kappa shows a high level of interrater reliability.
- The Airway Intervention rubric demonstrates ease of utilization and calibration.
- After analyzing data from 150 patients for this study, we will determine if further modifications to data collection are needed. These alterations are not related to actual type of airway interventions or rescue sequence, but are related to assessment of these interventions and the Airway Score.
- Individual components of the rubric will be evaluated after data collection is complete to determine the effect on the overall score.