

Patient Safety Outcomes Between Sedation and General Anesthesia Treatment Modalities for Children with Early Childhood Caries



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INTRODUCTION

The field of dentistry is a profession concerned with patient safety and is continually evolving to provide the highest quality of care to patients by implementing techniques to enhance success and patient safety¹. Developing children can lack the ability and coping skills necessary to undergo dental treatment without pharmacologic behavior management, therefore sedation and general anesthesia are common treatment modalities in pediatric dentistry.

These treatment modalities carry inherent risks² therefore the assessment of patient safety outcomes are important to assist practitioners and parents when making treatment planning decisions.

This study is a sub-study of a multi-site research project comparing the prevalence of mortality and morbidity between children with early childhood caries under the age 7 years old who are treated under sedation and general anesthesia.

PURPOSE

The aim of the study was to evaluate patient safety outcomes between sedation and general anesthesia behavioral treatment methods for children with early childhood caries.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS

	Overall 2484	Minimal SED 174	Moderate SED 1199	Deep SED 7	GA 1103	p-value
n						
Child's age in years; mean (sd); Ordinal						0.001
Less than 1	15 (0.6)	0 (0.0)	1 (0.1)	0 (0.0)	14 (1.3)	
1 to less than 2	178 (7.2)	8 (4.6)	87 (7.3)	2 (28.6)	81 (7.3)	
2 to less than 3	453 (18.2)	34 (19.5)	216 (18.0)	2 (28.6)	201 (18.2)	
3 to less than 4	647 (26.0)	51 (29.3)	291 (24.3)	1 (14.3)	304 (27.6)	
4 to less than 5	675 (27.2)	46 (26.4)	316 (26.4)	2 (28.6)	311 (28.2)	
5 to less than 6	516 (20.8)	35 (20.1)	288 (24.0)	0 (0.0)	192 (17.4)	
6 to less than 7	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Sex (%); Nominal						0.827
Male	1296 (52.2)	93 (53.4)	610 (50.9)	3 (42.9)	589 (53.4)	
Female	1187 (47.8)	81 (46.6)	588 (49.0)	4 (57.1)	514 (46.6)	
Other	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
No response	1 (0.0)	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)	
Child's Race/Ethnicity n (%); Nominal						<0.001
Hispanic	879 (35.4)	80 (46.0)	464 (38.7)	2 (28.6)	332 (30.1)	
White, Non-Hispanic	522 (21.0)	41 (23.6)	225 (18.8)	4 (57.1)	252 (22.8)	
Black or African American, Non-Hispanic	441 (17.8)	31 (17.8)	178 (14.8)	1 (14.3)	231 (20.9)	
American Indian or Native Alaskan, Non-Hispanic	300 (12.1)	2 (1.1)	170 (14.2)	0 (0.0)	128 (11.6)	
Asian, Non-Hispanic	48 (1.9)	1 (0.6)	28 (2.3)	0 (0.0)	19 (1.7)	
Native Hawaiian or Other Pacific Islander, Non-Hispanic	6 (0.2)	1 (0.6)	3 (0.3)	0 (0.0)	2 (0.2)	
Two or more races, Non-Hispanic	7 (0.3)	0 (0.0)	2 (0.2)	0 (0.0)	5 (0.5)	
No response	281 (11.3)	18 (10.3)	129 (10.8)	0 (0.0)	134 (12.1)	
ASA Classification; n (%); Nominal						<0.001
ASA 1	2065 (83.2)	166 (95.4)	1048 (87.4)	4 (57.1)	847 (76.8)	
ASA 2	405 (16.3)	8 (4.6)	149 (12.4)	3 (42.9)	245 (22.2)	
ASA 3	13 (0.5)	0 (0.0)	2 (0.2)	0 (0.0)	11 (1.0)	
Payor Source; n (%); Nominal						<0.001
Medicaid	2213 (89.1)	160 (92.0)	1053 (87.8)	7 (100.0)	992 (89.9)	
Children's Health Insurance Program (CHIP)	10 (0.4)	1 (0.6)	4 (0.3)	0 (0.0)	5 (0.5)	
Commercial Insurance	99 (4.0)	7 (4.0)	53 (4.4)	0 (0.0)	39 (3.5)	
No Insurance	68 (2.7)	4 (2.3)	62 (5.2)	0 (0.0)	2 (0.2)	
Multiple insurance coverage	38 (1.5)	2 (1.1)	21 (1.8)	0 (0.0)	15 (1.4)	
No response	56 (2.3)	0 (0.0)	6 (0.5)	0 (0.0)	50 (4.5)	

TABLE 2. Duration of General Anesthesia and Prevalence of Oxygen Saturation Events < 90%

	Overall	*Oxygen saturation < 90%	**Oxygen saturation >= 90%	p-value
n	1098	5	1093	
***Duration of general anesthesia (median (IQR))	110 (65)	117 (15)	110 (65)	0.5438

* Oxygen saturation below 90% = "Yes"
 * Oxygen saturation below 90% = "No"
 ***Duration of general anesthesia = "Total duration of sedation or general anesthesia procedure (in minutes)"

TABLE 3. Prevalence of Wrong Site Treatment for Children Treated Under Sedation and General Anesthesia

	Overall 2484	*Sedation 1380	**General Anesthesia 1103	p-value
***Wrong site treatment n (%)				0.529
Yes	1 (0.0)	0 (0.0)	1 (0.1)	
No	2476 (99.9)	1376 (99.9)	1100 (99.8)	
No response	2 (0.1)	1 (0.1)	1 (0.1)	

* Sedation = "Pharmacological behavior management technique" is answered as "Minimal sedation," "Moderate sedation," "Deep sedation"
 ** General Anesthesia = "Pharmacological behaviors management technique" is answered as "General Anesthesia"
 *** Wrong site treatment = "Wrong site treated (e.g., wrong tooth treated)"

TABLE 4. Prevalence of Soft Tissue Damage Events for Children Treated Under Sedation With or Without Protective Stabilization

	Overall	Sedation		p-value
		*With protective stabilization	**Without protective stabilization	
n	1347	831	516	
*** Soft tissue damage; n (%)				0.704
Yes	20 (1.5)	14 (1.7)	6 (1.2)	
No	1324 (98.4)	816 (98.2)	508 (98.6)	
No Response	2 (0.1)	1 (0.1)	1 (0.2)	

* With protective stabilization = Papoose or other body stabilization equipment/technique utilized
 ** Without protective stabilization = No papoose or other body stabilization equipment/technique utilized

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METHODS

- A retrospective chart review was conducted for 2,484 children, aged zero to seven years of age, that received dental treatment for early childhood caries under sedation general anesthesia from 2010-2019.
- Convenience, stratified, random sampling was used to select dental records from NYU Langone Hospitals Advanced Education in Pediatric Dentistry NYU training locations in Alaska, Arizona (Tucson), Florida, Massachusetts, New York, and Tennessee were reviewed.
- Means and standard deviations were presented for continuous variables and n (%) was presented for categorical variables.
- P-values were obtained by the Chi-square test (Tables 1, 3 & 4) and the Wilcoxon rank sum test (Table 2).

RESULTS

- An analysis of 2,484 dental records was completed to evaluate the prevalence of three different patient safety outcome measures (Table 1).
- Most of the dental records reviewed were for children between 3 to less than 4 years of age 647 (26%) and 4 to less than 5 years of age 675 (27.2%) (Table 1).
- The study population was 1296 (52.2%) male and 1187 (47.8%) female (Table 1).
- Most of the study population, 2065 (83.2%), had Medicaid coverage on the date of service (Table 1).
- Review of 1098 general anesthesia records noted no increase in the incidence of oxygen saturation events below 90% with an increase in time spent under general anesthesia (p=0.54) (Table 2).
- Evaluation of 2484 records noted no significant difference in wrong site treatment when comparing sedation and general anesthesia treatment modalities (p=0.52) (Table 3).
- A total of 1347 records were reviewed noting no significant difference in the prevalence of soft tissue damage events, with or without the use of protective stabilization, for children treated under sedation (p=0.704) (Table 4).

CONCLUSION

- The results of this study suggest no significant relationship between the prevalence of oxygen desaturation events, wrong site treatment, or soft tissue damage (with or without the use of protective stabilization) under sedation or general anesthesia behavioral treatment modalities for children ages zero to seven with early childhood caries.
- Although the results show no statistical significance regarding the adverse outcomes discussed, dentists should continue to practice these treatment modalities with the utmost diligence to provide great care and safety to their patients.