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Aline Morin
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Current Clinical and Curricula Experiences of Postgraduate Pediatric Dentistry Programs on non-IV conscious sedation in the United States

Aline Morin, DMD

A Thesis Presented to the Faculty of the College of Dental Medicine of Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of MASTER OF SCIENCE IN DENTISTRY

Directed by: Dr. Romer Ocanto, DDS, MEd, MS: Primary Research Mentor

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September, 2015

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Current Clinical and Curricula Experiences of Postgraduate Pediatric Dentistry Programs on non-IV conscious sedation in the United States

By:

Aline Morin, D.M.D

A thesis submitted to the College of Dental Medicine of Nova Southeastern University in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN DENTISTRY

Department of Pediatric Dentistry

College of Dental Medicine

Nova Southeastern University

August 2015

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TITLE OF SUBMISSION: Current Clinical and Curricula Experiences of Postgraduate Pediatric Dentistry Programs on non-IV conscious sedation in the United States

DATE SUBMITTED: September, 15, 2015

I certify that I am the sole author of this thesis, and that any assistance I received in its preparation has been fully acknowledges and disclosed in the thesis. I have cited any sources from which I used ideas, data, or words, and labeled as quotations any directly quoted phrases or passages, as well as providing proper documentation and citations. The thesis was prepared by me, specifically for the M.S. degree and for this assignment.

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Dedication

I would like to dedicate this thesis to my loving family, especially my mother who has always been extremely supportive of me throughout my life. Thank you for your unconditional love and constant encouragement. I am blessed to have you as my mother and my friend. The words cannot describe how much I love you.

I would also like to thank my loving sister for her enormous support and love. Thank you for always being here for me and being such an amazing sister.

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ABSTRACT

Current Clinical and Curricula Experiences of Postgraduate Pediatric Dentistry Programs on non-IV conscious sedation in the United States

DEGREE DATE: AUGUST 2015

ALINE MORIN, D.M.D., MASTER OF SCIENCE IN DENTISTRY, 2015

COLLEGE OF DENTAL MEDICINE, NOVA SOUTHEASTERN UNIVERSTIY

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Purpose: The aims of this study were to: (1) evaluate the prevalence of compliance of Postgraduate Pediatric Dentistry Programs (PPDPs) in the United States with the current American Academy of Pediatric Dentistry (AAPD) sedation guidelines and Commission On Dental Accreditation (CODA) sedation curriculum requirements and identify barriers to and facilitators for implementation of such guidelines; (2) identify changes to-date in sedation practices of PPDP since the previously published AAPD sedation guidelines (2011); and (3) determine the independent association of compliance of PPDP with program setting.

Methods: A 40-item questionnaire was emailed to all postgraduate pediatric dentistry program directors (PPDPDs) of CODA accredited programs in the U.S. (n=74). Bivariate analysis, chi-square, Monte Carlo simulation and Kruskal-Wallis tests were used to analyze the data.

Results: 70% of surveyed participants responded (n=52). On average, PPDPs were found to be compliant with both AAPD and CODA sedation standards. The bivariate analysis showed that both current setting of PPDPs and PPDPDs training setting did not affect the compliance of the program with the AAPD and the CODA sedation guidelines. Directors that stated receiving an "excellent sedation training" were more likely to be compliant with the CODA sedation standards (p=0.01). In this study, a major perceived barrier for increasing the number of non-IV conscious sedation cases per residents was a lack of patient pool (37%). When comparing changes in the sedation practice of PPDPs between 2009 and 2011, more sedation emergency drills were found to be performed in 2015 (p=0.05).

Conclusion:

Most PPDPs were compliant with both the AAPD and CODA sedation standards. Most PPDPDs were in favor of the 2013 increase number of sedation required by CODA. Both PPDPD training setting and PPDP setting did not affect the compliance of the programs with the AAPD sedation guidelines and the CODA sedation standards. PPDPs with PPDPDs who reported an excellent sedation training were more likely to be more compliant with the CODA sedation guidelines. Finally, PPDP setting did not affect the number of patients receiving non-IV conscious sedation or the number of sedation ER experienced per year.

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1.1 Overview

Office sedation has long been indicated for the preschool uncooperative child, the extremely fearful and anxious child, and the child with special health care needs (CSHCN) who need extensive dental or medical treatment.[1] Providing dental care for these populations can be very challenging due to their underdeveloped cognitive and emotional abilities leading to failure of non-pharmacologic behavioral management techniques.[1] The 2013-2014 Guidelines of the American Academy of Pediatric Dentistry (AAPD) state, "Sedation in children is often administered to control behavior to allow the safe completion of a procedure."[2] The use of office based sedation as an option to deliver dental treatment for preschool and special health care need children has become increasingly common since the narcotic Nisentil, developed by Hoffman- LaRoche Laboratories, was first used by pediatric dentists in 1980.[3]

In-office sedation is often the only option for rendering dental care before deferring to general anesthesia (GA). Pediatric dentists most frequently deliver sedation by oral route.[1] When the need for oral sedation is not met, the result may be compromised dental care that serves as a barrier to access to care. It is commonly recognized that inadequate access to oral health care places children at a higher risk for comorbidities.[4,5] A cross sectional study by Gomes et al. emphasized the importance of providing dental care for preschool children by showing that early childhood caries led to a decreased quality of life of both children and their families.[6]

The National Survey of Children with Special Health Care Needs (CSHCN) in 2009-2010 reported that over 11.2 million CSHCN were younger than 18 years old representing 15% of all US children with "a modest increase from approximately 13% reported in 2001."[7,8] Kerins and Casammassimo evaluated 57 dental schools, 61 advanced education in general dentistry programs, 174 general practice residency programs and 87 children's hospital in 6 of the AAPD districts and reported that "the average patient load per provider is approximately 2,000 CSHCN."[7] Estimates surrounding implementation of the Affordable Care Act indicate that approximately 8.7 million children could gain extensive dental coverage by 2018, potentially increasing access to care for CSHCN.[9]

Multiple studies have found that parenting styles impact children's behavior in the dental care setting, and observed an increased frequency of uncooperative children needing dental work, as well as an increase in the acceptance of parents to have their children treated under oral sedation.[10-12] The result has been an increase in in-office sedation for preschool children and CSHCN in recent years.

Studies have reported that the use of in-office oral sedation by pediatric dentists who are members of the College of Diplomats of the American Board of Pediatric Dentistry (CDABPD) has increased. [13-17] Davis, in 1988, reported the results of a survey of CDABPD members that found "more than 68% of respondents used conscious sedation in their practices."[13] In 2002, Houpt's national survey of members of the AAPD

found that "there was an overall increased in the use of sedation by pediatric dentists" compared to the results of similar surveys administered in 1985, 1991, and 1995.[16]

In 2012, Johnson et al. reported the results of a survey sent to 1219 pediatric dentists to identify the factors that influenced their practice of conscious sedation in dental offices and found that 63% of the respondents stated using conscious sedation. The primary reason reported for practicing conscious sedation was ability to provide dental care for the difficult patient. On the other hand, not wanting the liability that comes with conscious sedation was the main reason reported by those who did not sedate.[17]

The high prevalence of CSHCN underscores the demand for oral sedation as an adjunct for delivery of dental treatment to this segment of the population. Clearly, the increased demand for oral sedation services provides an imperative for training institutions to deliver curriculum focused on oral sedation and experience in its clinical application.[18] The Commission on Dental Accreditation (CODA) mandates every accredited postgraduate pediatric dentistry program (PPDP) in the United States to teach sedation to its residents.[19]

1.2 History of Conscious Sedation

Alcohol and opium were the first drugs known to provide a sedative effect to ancient civilizations.[20] The opium seed was first discovered 3500 BC in Southwest Asia where the Summerians called it the "joy plant." Cultivations flourished in the Middle East by the Assyrians and later with the Babylonians and Egyptians.[20] An Epyptian papyrus dating from the 1550 BC mentions a way to "stop a crying a child" using grains

of the poppy plant. Thirty four centuries later, physicians and pharmacists in the United States were prescribing opiates for women suffering from menstrual pain. [20]

Chloral hydrate, synthesized in 1832 was one of the first sedative solution used. Its use thrived from the middle of the 19th century to the end of the 20th century where its main purpose was in pediatrics for the sedation of children for "minor surgery during dental or diagnostic procedures."[21] In 1904, barbiturates were introduced to patients suffering from neuroses and psychoses and the improvement in their prognosis was significant. [22] Barbiturates quickly became of common use in the induction of general anesthesia for minor surgical procedures.[22] Soon enough, they became the number one reason of drug overdose which led to the public recognizing their narrow therapeutic range. [22] In 1955, La Roche laboratories synthesized the first benzodiazepine: "Librium."[23] In 1963, diazepam was made. The broader therapeutic range of the benzodiazepine made them gain popularity over the barbiturates. Shortly after, they became the "most frequently prescribed drug."[23]

Pediatric sedation was first used in Europe in the emergency rooms for pediatric patients.[24] It was not until the 1970s that pediatric dental sedation was introduced in the United States and used by private pediatric dentists.[25] In 1975, numerous pharmacologic agents were used in private dental practices and teaching venues. Chloral hydrate very popular in the 1980s was slowly replaced by hydroxyzine and benzidiazepines. [25] In 1980, non- IV conscious sedation quickly spread to different specialities such as radiology, anesthesia, gastroenterology, and neurology for the treatment of young

patients.[25] Today, a variety of sedation medications are available but local and national regulations often limit the sedation practice to specific agents and those with specific credentials. Some specialties have established certification and credentials for sedation delivery whereas most have not.[25] The challenge remains though that there is no standardization of sedation practices, guidelines, and credentialing; in fact several specialties have guidelines and endorsements for their own practice that contradict the guidelines set forth by other specialties. [25]

1.3 The Use of non-IV conscious sedation in Postgraduate Pediatric Dentistry Programs in the United States

In 2001, Wilson et al. evaluated the conscious sedation experiences in PPDPs and concluded that "significant change has occurred in the teaching of sedation in postgraduate pediatric dentistry programs over the past decade in general, however, program directors do not feel that sedation training should be standardized, except in the area of emergency management."[26] In 2009, Pope-Ozimba et al. (non published data) using a similar survey to program directors, reported that substantial changes had occurred in the teaching of sedation in pediatric dentistry residency programs, yet there was still a need for "standardization in didactics, clinical training, and faculty training for doing sedations."[27] In 2009, Wilson and Nathan surveyed program directors, second year students, and recently graduated students of PPDP in the United States regarding sedation education and standardization with the AAPD Guidelines, and concluded that "there was a wide disparity between sedation practices in advanced pediatric dentistry programs and that strategies should be developed to strengthen consistency of

competencies in sedation practices across academic training programs."[28] Two years later, in 2013, CODA increased the number of sedations required to be performed by residents from twenty five to fifty, stating in its Standards for Pediatric Dentistry that students are required to complete a "minimum of 50 patient encounters in which sedative agents other than nitrous oxide (but may include nitrous oxide in combination with other agents) are used." [29]

1.4 Sedation Adverse Related Events

Accompanying the increase in non-hospital sedations has been an increase in sedation related adverse events. [30] Although there are multiple studies and survey reports since the past decades on adverse related sedation events, there is little data available to quantify morbidity and mortality related to dental non-IV conscious sedation. [30] Cote et al. used the technique of critical incident analysis to report adverse sedation events derived from the Food and Drug Administration's adverse drug event reporting system, the US Pharmacopeia, and from pediatric (medical and dental) specialists, for children less than twenty years old.[31] Adverse outcomes included death, permanent neurologic injury, prolonged hospitalization without injury, and no harm. Non-hospital based facilities were found to have more frequently resulted in permanent neurologic injury or deaths, and inadequate resuscitations compared to hospital based facilities. He described a "strong positive relationship between successful outcome (no harm or prolonged hospitalization without injury) in patients monitored with pulse oximetry, and unsuccessful outcome (death or permanent neurologic injury) in patients whose reports specifically stated that no physiologic monitoring was used."[31] Additionally, the results

showed that most of the children undergoing dental treatment and who suffered from adverse related events did not have increased risk from a predisposing medical condition. The most common issues observed to be associated with adverse sedation events were linked primarily to respiratory depression caused by the sedative drugs. Other risk factors included inadequate resuscitation, medications errors, inadequate monitoring, and inadequate medical evaluation before sedation. Cote et al. concluded by recommending the need for "improved training and monitoring standards for dental practitioners who care for children who do not need general anesthesia."[31]

Lee et al. reviewed the media reports of incidents occurring in dental offices, ambulatory surgery centers, and hospitals related to mortalities associated to dental sedations and concluded that more than half of the deaths (56%) happened in children aged 2-5 years old undergoing moderate sedation and that errors occurred mostly in offices due to "fewer resources, a lack of specialty training, lack of trained resuscitation providers, or differing anesthesia practices in office settings."[30]

1.5 AAPD Sedation Guidelines

The apparent importance of adhering to the AAP/ AAPD sedation guidelines for monitoring and management of patients during and after in office sedation to prevent adverse outcomes, outlined above,[29-31] emphasize that providing a safe and efficient sedation comes with a systematic approach and thorough knowledge of the practice standards established by the AAPD sedation guidelines.

Guidelines on sedation were first published in July 1985 in both the Journal of the American Academy of Pediatrics (JAAP) and the Journal of the American Academy of Pediatric Dentistry (JAAPD), culminating five years of rigorous work by individual physicians and professional organizations.[2] The guidelines were modified in 2006 and 2011 to increase safety and efficiency of in-office non-IV conscious sedations. However few studies have compared sedation practices of pediatric dentists to those recommended by the guidelines; the most recent study by Wilson et al. was in 1996.[15] Wilson et al. surveyed the in-office sedation practices of 1758 AAPD members and found that among surveyed practitioners, almost three-quarters (74%) did not use physiologic monitors when using Nitrous Oxide alone, 10% did not use monitors when Nitrous Oxide was used in combination with other sedative agents, and the majority (59%) did not use a time-based recording of physiological parameters.[15] Wilson et al. concluded that there was "a mixed impression about practitioners' use of Nitrous Oxide and sedative agents, suggesting variability in practitioner habits related to pharmacologic patient management."[15]

1.5.1. American Academy of Pediatric Dentistry (AAPD) General guidelines on sedation:

1) **Candidates:** Patients who are in ASA classes I and II are frequently considered appropriate candidates for minimal, moderate, or deep sedation. Children in ASA classes III and IV, children with special needs, and those with anatomic airway abnormalities or extreme tonsillar hypertrophy present issues that require additional and individual

consideration, particularly for moderate and deep sedation. Practitioners are encouraged to consult with appropriate subspecialists and/or anesthesiologist for patients at increased risk of experiencing adverse sedation events because of their underlying medical/surgical conditions. [2]

2) **Responsible person:** The pediatric patient shall be accompanied to and from the treatment facility by a parent, legal guardian, or other responsible person. It is preferable to have two or more adults accompany children who are still in car safety seats if transportation to and from a treatment facility is provided by one of the adults.[2]

3) **The practitioner:** The individual must be trained in and capable of providing pediatric basic life support. At least one individual must be present who is trained in, and capable of, providing advanced pediatric life support. Training in pediatric advanced life support is required. A current certification in Basic Life Support for Healthcare Providers and current certification in Advanced Cardiac Life Support (ACLS) and his/her clinical staff to maintain current certification in Basic Life Support for Healthcare Providers.[2]

4) **Facilities:** The practitioner who uses sedation must have immediately available facilities, personnel, and equipment to manage emergency and rescue situations.[2]

5) **Preparation and Setting up for sedation procedures**: A commonly used acronym useful in planning and preparation for a procedure is SOAPME: S: suction, O: adequate oxygen supply, A=airway: nasopharyngeal and oropharyngeal airways, laryngoscope blades, endotracheal tubes, stylets, face mask, bag valve or equivalent device.

P: pharmacy, reversal agents, M: monitors.[2]

6) **Documentation:** Before sedation, a health evaluation should be performed by an appropriately-licensed practitioner and reviewed by the sedation team at the time of

treatment for possible interval changes. The patient's chart shall contain a time-based record that includes the name, route, site, time, dosage, and patient effect of administered drugs. After a sedation, a child who has received moderate sedation must be observed in a suitably equipped recovery facility.[2]

7) **Monitors:** There shall be continuous monitoring of oxygen saturation and hear rate and intermittent recording of respiratory rate and blood pressure; they should be recorded in a time-based record. Also, the child's head position should be checked frequently to ensure airway patency.[2]

8) **Continuous quality improvement:** each facility should maintain records that track adverse events, such as desaturation, apnea, laryngospasm, the need for airway interventions including jaw thrust, positive pressure ventilation, prolonged sedation, unanticipated use of reversal agents, unintended or prolonged hospital admission, and unsatisfactory sedation/analgesia/anxiolysis.[2]

9) **Discharge Protocol**: The time and condition of the child at discharge from the treatment area or facility shall be documented; this should include documentation that the child's level of consciousness and oxygen saturation in room air have returned to a state that is safe for discharge by recognized criteria.[2]

1.6 CODA sedation standards:

Similarly to the AAPD, the Commission on Dental Accreditation has put forth a number of sedation policies in order to establish standardization of non-IV conscious sedation in postgraduate pediatric dentistry programs. [29]

1) All sedation cases must be completed in accordance with the recommendations and guidelines of AAPD/AAP, the ADA's Teaching of Pain Control and Sedation to Dentists and Dental Students, and relevant institutional policies.[29]

2) Students/Residents must act as operator in a minimum of 25 sedation cases.[29]

3) Students/Resident must complete a minimum of 50 patient encounters in which sedative agents other than nitrous oxide (but may include nitrous oxide in combination with other agents) are used. There agents may be administered by any route.

a. Of the 50 patient encounters, each student/ resident must act as operator in a minimum of 25 sedation cases

b. Of the remaining sedation cases (those not performed as the primary operatory), each student/ resident must gain clinical experience, which can be in a variety of activities or settings, including individual or functional group monitoring or human simulation. [29]

4) Students/ Residents, faculty and staff engaged in provision of pharmacologic behavior guidance must be certified in PALS or ACLS in accordance with guidelines of the American Academy of Pediatric Dentistry, and institutional and state regulations.[29]

1.7 State Board Sedation Regulation in the United Sates

State dental boards are responsible to regulate sedation practices. The trend has been for both scrutiny and regulation of sedations practices to increase in order to establish safe standards of practice, particularly in response to the increased number of reported adverse related sedation events.[32] In 2012, for example, 41 states required a dental conscious sedation permit (7 only regulated sedation by the parenteral route) for pediatric or general dentists performing oral sedation but 9 states did not. [33]

As recently as 2011, LaPointe et al. reported that of the 41 states requiring permits for provision of non-IV conscious sedation, regulations require that the patient must be monitored "throughout the procedure and during recovery until discharge."[33] Additionally, these 41 states require that the practitioner and clinical staff to be properly trained to "manage a sedation related emergency." [33] LaPointe et al. concluded that regulation of oral sedation over the past decade had increased tremendously, but that gross disparities among state dental board permit requirements existed, prompting LaPointe et al. to call for "a more nationally unified approach for regulating oral sedation." [33] Increased regulation was also demonstrated when the Florida Dental Board (2013) implemented Florida Statutes 466.0135(1) that require a 4-hour course on airway management in the State of Florida for the provision of pediatric in office non-IV conscious sedation. The Florida Dental Board further states that future enforcement will include the use of the capnograph as a ventilation monitor in addition to the precordial stethoscope.[34]

The challenge however remains that there is no standardization of sedation practice, guidelines, and credentialing throughout all the States. [33] In light of the seriousness of in-office oral sedation associated adverse incidents, and the national disparity in state dental board regulations of in-office oral sedation, a current understanding of the compliance of postgraduate pediatric dentistry teaching institutions, through curriculum and training with the CODA standards and the AAPD Guidelines is critically important.

1.7 Specific Aims and Hypothesis

The goals of this study were:

(1) to assess national PPDP non-IV conscious sedation protocols, experiences, and curricula, (2) to define PPDP compliance, or lack thereof, with the AAPD sedation guidelines and CODA standards; (3) to evaluate the impact of the 2011 AAPD sedation guidelines on programs' practices; and (4) to ascertain the independent association of selected PPDP setting variables with compliance of the AAPD guidelines and CODA standards.

Specific Aim 1: Describe the didactic sedation curricula and sedation clinical experiences required of postgraduate pediatric dentistry programs

Specific Aim 2: Evaluate the prevalence of compliance of postgraduate pediatric dentistry programs in the United States with the current AAPD sedation guidelines and CODA sedation curriculum requirements.

Specific Aim 3: Evaluate the independent association of postgraduate pediatric dentistry program compliance with (1) the AAPD sedation guidelines, (2) CODA standards for sedation and (3) selected program settings (i.e., University based vs. Hospital based).

Hypothesis 1: Hospital-based programs tend to be more compliant with CODA and/or AAPD sedation guidelines.
Null hypothesis 1: Hospital-based programs are not more compliant than university-based or combined programs with CODA and/or AAPD sedation guidelines.
Hypothesis 2: PPDPs tend to be more compliant when their PPDPDs were trained in hospital programs.
Null Hypothesis 2: PPDPs did not tend to be more compliant when their PPDPDs were trained in hospital programs.
Hypothesis 3: PPDPs tend to be more compliant when their PPDPDs reported receiving a "good" to "excellent" sedation training.
Null Hypothesis 3: PPDPs did not tend to be more compliant when their PPDPDs reported receiving a "good" to "excellent" sedation training.

Specific Aim 4: Determine if a relationship exists between PPDPs settings and the amount of patient referred to non-IV conscious sedation or the number of sedation ER experienced.
Hypothesis 1: Patients in hospital-based PPDPs tend to receive non-IV conscious sedation more frequently than those in university or combined programs.
Null Hypothesis 1: Patients in hospital-based PPDPs do not tend to receive non-IV conscious sedation more frequently than those in university or combined programs
Hypothesis 2: Hospital-based PPDPs tend to experience less sedation ER than other programs.
Null Hypothesis 2: Hospital-based PPDPs tend to experience less sedation ER than other programs.

Specific Aim 5: Identify changes to-date that may have occurred in the didactic sedation curricula and sedation clinical experiences required of postgraduate pediatric dentistry programs since the previously published AAPD sedation guidelines (2011).

Hypothesis: There are changes in the didactic sedation curricula and sedation clinical experiences of PPDP since the previously published AAPD sedation guidelines (2011).
Null hypothesis: There are no changes in the didactic sedation curricula and sedation clinical experiences of PPDP since the previously published AAPD sedation guidelines (2011).

Specific Aim 6: Identify barriers to and facilitators for implementation of such guidelines
Hypothesis 1: The major barrier for implementation of both AAPD and CODA sedation guidelines is the lack of trained faculty in PPDPs.
Hypothesis 2: The major facilitator for implementation of both AAPD and CODA sedation guidelines is increasing the funds devoted for non-IV conscious sedation.

Chapter 2: Methods

2.1 Design

This study used a cross-sectional research design and a survey instrument to assess the univariate descriptive statistical relationship and bivariate statistics of compliance of PPDP in the United States with the AAPD sedation guidelines and the CODA sedation standards. The study was approved by the Institutional Review Board (IRB) at Nova Southeastern University (NSU) and funded by the Health Profession Division (HPD) Research Committee.

2.2 Setting

The AAPD headquarters keep an updated mailing and email list of all program directors currently employed at CODA accredited PPDP in the United States. In order to access the email list, a one-time fee of $250.00 was paid to the AAPD. Following the IRB approval, the survey was pilot-tested among a small panel of "experts" that consisted of five pediatric dentistry faculty at Nova Southeastern University Pediatric Dentistry program: Drs. Larumbe, White, Noguera, Arnold and Dr. Sherman, and five faculty from the Center for Psychological studies with a Doctorate in Psychology: Drs. Fins, DePiano, Mace, Albert, and Dr. Kibler.

The small panel of "experts" were asked for feedback regarding: (1) their understanding of the purpose of the study (2) the items (3) visual appearance of the survey instrument, (4) content of the instrument relative to the study specific aims (5)

ease (or lack thereof) of completing the survey, (6) and other comments or suggestions to improve the instrument. The pilot testers' comments and recommendations were integrated into the finalized survey.

The methodology chosen to implement the survey followed the Tailored Designed Method (TDM) of Dillman (2000).[35] The TDM was adopted in order to decrease nonresponse rates. This survey allowed PPDPDs to express their concerns or contentment towards the new CODA sedation curriculum requirements and the changes in sedation experiences at their respective programs emphasizing the Social Exchange Theory where by responding to the survey, "respondents will be compensated in return in a way that meets some of their needs."[35]

SurveyMonkey®, an online survey software, was used to administer the survey. Postgraduate Pediatric Dentistry Program Directors (PPDPDs) first received a pre-notice email message four days ahead of the actual questionnaire. Four days later, a cover letter was sent to the same subjects with an email invitation to complete the 40-item survey instrument pertaining to the sedation experiences of the residents enrolled in the postgraduate pediatric dentistry programs they administer. The cover letter briefly explained the request, selection criteria, purpose of the survey, confidentiality, and directions needed to complete the survey. It also contained an opt-out statement.

A sample of topics covered by the survey items was: PPDP settings, process followed for the selection of patients for conscious sedations, guidelines used in the clinic, monitoring and protocols followed for sedations, emergency policies as well as the didactic topics taught to residents, and PPDPDs personal sedation experiences.

PPDPDs were able to respond to the questionnaires by completing the web-based survey by clicking on the link present in the email. An automated thank you page appeared right after the completion of the survey and respondents were asked to enter their email address in order to receive the incentive of $20.00 Target Digital gift card. The surveys were not linked allowing the answers of the first survey to remain anonymous. Four weeks later, a reminder message with an invitation to complete the survey was sent. Three weeks later, the same email was sent again to non respondents. Four weeks from that date, the survey was sent once again. One week later, the survey was sent to non respondents in order to obtain a response rate of 52 (70% response rate) and one week from that date, the chance to participate in the survey was terminated.

2.3 Target Population

The proposed sample included all postgraduate pediatric dentistry program directors (PPDPDs) in the United States. As of October 2014, there are 75 PPDPDs with complete e-mail address listed on the AAPD directory list. The inclusion criterion was simply employment as the postgraduate program director of a CODA accredited PPDP in the U.S other than Nova Southeastern University. The final sample size consisted of 74 program directors.

2.4 Instrumentation:

The infrastructure of PPDP when treating patients with non-IV conscious sedation, the changes in sedation practices since the 2011 revised AAPD Guidelines, the knowledge of, and compliance, or lack thereof, of programs with both the AAPD sedation guidelines and the sedation CODA curriculum requirements, as well as the attitudes and perceptions of program directors towards such guidelines and standards were all measured using a 40-item survey instrument that was constructed using the TDM developed by Dillman (2000).[35] The survey was designed following principles to reduce coverage, measurement, and nonresponse errors. The selection bias was eliminated by surveying all PPDPDs in the United States (74).

The survey instrument included binary, rating scales, single and multiple select, and close-ended items. The questions were presented as numbered items using boxes to select answer spaces. Symmetry and consistent format were maintained throughout the questionnaire for increased legibility. The survey instrument is attached (See Appendix 1).

2.4.1 Dependent and Independent Variables:

PPDP settings (independent variable) ***and PPDPD parameters*** were used to assess PPDP compliance (dependent variable) with both AAPD sedation guidelines and CODA sedation standards.

PPDP settings included PPDP program type: hospital based, university based or a combination of both. ***PPDPD parameters*** included PPDPDs' self-reported quality of sedation training and setting of the program where they obtained their advanced pediatric dental training. These 3 items were developed by the researchers to assess the infrastructure of CODA accredited PPDP in the United States. Questions related to these items were questions 2, 3, and 4.

PPDP procedural compliance with the AAPD sedation guidelines (dependent variable) were measured through an evaluation of the PPDPDs' knowledge (independent variable) of the AAPD sedation guidelines and the protocols (independent variable) taught and followed by residents enrolled in PPDP.

The following items were used to measure compliance: the use of a presedation evaluation on all selected patients for sedation (question 14), the number of people required to carry out mild and moderate non-IV conscious sedations (questions 15 and 16), the number of people required to escort pediatric patients after receiving non-IV conscious sedation (question 17), the certification of the supporting staff and residents carrying non-IV conscious sedation (questions 24 and 25), the use of the AAPD sedation recording sheet (question 25), the use of monitors recommended by the AAPD for non-IV conscious sedation (questions 26 and 27), and the discharge criteria followed (question 32,33 and 34).

These 14 items were developed by the researchers directly based from the AAPD Guideline for Monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures reference manual. [2]

PPDP compliance with the CODA curriculum requirements of 2013 (dependent variable) were measured with the didactic and clinical protocols (independent variables) taught by PPDPDs. They included all of the previous items used to assess AAPD sedation guidelines as well as the current certification of staff and residents carrying non-IV conscious sedation (questions 24 and 25) and the number of non-IV conscious sedation provided and monitored by residents enrolled (questions 7 and 8).These 4 items were developed by the researchers directly based from the Accreditation Standards for Advanced Specialty Education Programs in Pediatric Dentistry.[29]

Changes to-date (dependent variable) ***in the non-IV conscious sedation protocols and experiences of PPDP*** were measured by comparing prior data from similar studies in the literature to the results obtained from questions 18,21,27,29,30 and 34 (independent variables).These items included: the number of emergency drills performed per year (question 21), the number of sedation emergencies reported before and after 2011 (question 23), the certifications for staff and residents to perform sedation (questions 24 and 25) the monitors used during sedation (question 26), the presence of specific monitoring training (question 28), and the presence of standardized written protocol for sedation (question 30).

Barriers and facilitators (independent variables) ***to implementation of the AAPD sedation guidelines and CODA sedation standards*** (dependent variables) were measured by questions 39 and 40.

Attitudes of PPDPDs toward the changes to-date in the AAPD sedation guidelines and sedation CODA curriculum requirements were measured by questions 37 and 38. Responses to question 38 contained items ranging from 1 (strongly agree) to 5 (strongly disagree).

2.5 Statistical data management and analysis

R studio 3.1.1. and Deducer were used for data management and data analysis. The following statistical tests were conducted for each of the proposed aims.

Specific Aim 1: Describe the didactic sedation curricula and sedation clinical experiences required of postgraduate pediatric dentistry programs.

Appropriate descriptive statistics were calculated for each study variable.

Specific Aim 2: Evaluate the prevalence of compliance of postgraduate pediatric dentistry programs in the United States with the current AAPD sedation guidelines and CODA sedation curriculum requirements. Appropriate descriptive statistics were calculated for each study variable. This included frequencies, percentages, measures of dispersion and central tendency.

Specific Aim 3: Evaluate the independent association of postgraduate pediatric dentistry program compliance with (1) the AAPD sedation guidelines, (2) CODA standards for sedation and (3) selected program settings (i.e., University based vs. Hospital based). Kruskal-Wallis test for non-parametric variable was used to assess if there was any statistical significant relationship between the independent variables and the dependent variables. The independent variables in this model were PPDP settings (hospital based/university based/combination) and PPDPDs' parameters (self-reported quality of sedation training obtained and setting where they received their postgraduate pediatric dental education) and the dependent variable was compliance with both the CODA sedation standard and the AAPD sedation guidelines.

Two new composite score dummy variables were created: one for PPDPs' compliance with the AAPD sedation standards and another for PPDPs' compliance with the CODA sedation requirements (dependent variables). The AAPD compliance composite score variable was developed by summing the scores of 14 questions (questions 14, 15, 16, 17, 20, 21, 24, 25, 26, 27, 31, 32, 33, and 34). Question 14: "What percentage of patients at your facility requires a pre-sedation evaluation?" had for answer 76-100%. Questions 15 and 16 asked for the number of chair side personnel needed to carry out procedures under mild and moderate non-IV conscious sedations respectively; the correct answers being one. Question 20 asked participants if they used a recording sheet during non-IV conscious sedation. Question 21 was related to the number of emergency drills performed with all of the answer choices being correct except for "never." Question 26 had for correct answer all of the answer choices and was given a total score of 7, one point for each answer

choice. Question 27 asked about the monitors used during sedation and the correct answers were: pulse oximeter, blood pressure sphygmanometer, and clinical assessment of the patient, for a total score of 3. Questions 30, 33 and 34 were a yes/no questions: "Do you have a standardized and written protocol for sedation?", "Does your institution use a written discharge protocol?", "Does your institution use a quality assurance protocol for adverse related sedation event?" with the correct answers being yes. Question 31 asked "Do the following represent an absolute contraindication for dental treatment under non-IV sedation" (answer choices were children in ASA I, ASA II, ASA III) with all three answer choices being the correct answer. The final score for the AAPD compliance ranged from a minimum score of 0 to a maximum score of 23.

The CODA compliance composite score variable was developed by summing the scores of the previous 14 questions (questions 14, 15, 16, 17, 20, 21, 26, 27, 31, 32, 33, And 34) and questions 7 and 8. As stated above, compliance with the CODA sedation standards implies being compliant with the AAPD sedation policies.[28] Questions 24 and 25 asked for the required certifications of the personnel and practitioner conducting non-IV conscious sedations and had for answer: PALS or ACLS for personnel, and for practitioners: BLS and PALS. Questions 7 and 8 asked how many non-IV conscious sedation encounters residents experienced as providers and as monitors. The correct answer for both of these questions were twenty five. Scores ranged from a 19 to 28, with higher scores meaning greater compliance of the PPDP with the CODA standards.

Specific Aim 4: Determine if a relationship exists between PPDPs settings and the amount of patient referred to non-IV conscious sedation or the number of sedation ER experienced

Hypothesis 1: Patients in hospital-based PPDPs tend to receive non-IV conscious sedation more frequently than those in university or combined programs.

Null Hypothesis 1: Patients in hospital-based PPDPs do not receive non-IV conscious sedation more frequently than those in university or combined programs.

Hypothesis 2: Hospital-based PPDPs tend to experience less sedation ER than other programs.

Null Hypothesis 2: Hospital-based PPDPs do not have a better management of ER than other programs.

Kruskas-Wallis tests for non parameters data were used to assess the difference between PPDP settings and the number of both patients receiving non-IV conscious sedation and sedation emergencies.

Specific Aim 5: Identify changes to-date that may have occurred in the didactic sedation curricula and sedation clinical experiences required of postgraduate pediatric dentistry programs since the previously published AAPD sedation guidelines (2011).

Hypothesis: There are changes in the didactic sedation curricula and sedation clinical experiences of PPDP since the previously published AAPD sedation guidelines (2011).

Null hypothesis: There are no changes in the didactic sedation curricula and sedation

clinical experiences of PPDP since the previously published AAPD sedation guidelines (2011). Chi-Square test of independence using the Monte Carlo Simulation and the Yates Correction factor were used.

Specific Aim 6: Identify barriers to and facilitators for implementation of such guidelines.

Hypothesis 1: The major barrier for implementation of both AAPD and CODA sedation guidelines is the lack of trained faculty in PPDPs.

Hypothesis 2: The major facilitator for implementation of both AAPD and CODA sedation guidelines is increasing the funds devoted for non-IV conscious sedation.

Descriptive statistics were used to assess the barriers and facilitators for the implementation of such guidelines.

Chapter 3: Results

3.1 Program Directors characteristics:

The proposed sample included all postgraduate pediatric dentistry program directors (PPDPDs) in the United States. As of October 2014, there are 74 PPDPDs with complete e-mail address listed on the AAPD directory list excluding the Nova Southeastern University PPDPD for IRB purposes. The online survey was sent to all 74 PPDPDs. 52 responses were received, an estimated overall response rate of 70.27% (52/74). The average years PPDPDs were employed at their current position was 9 years (±8.5 SD; range=0.9-31 years).

Table 1: Characteristics of participating PPDPDs

Programs Setting where PPDPDs received their advanced pediatric dentistry training	**n**	**%**
Hospital Based Program	28	54%
University Based Program	4	8%
Combined Program	20	38%
Program Setting of current PPDPDs		
Hospital Based Program	27	52%
University Based Program	11	21%
Combined Program	14	27%
Self-reported quality of non-IV conscious sedation training of PPDPDs		
None	5	10%
Poor	9	17%
Good	23	44%
Excellent	15	29%

Table 1 depicts the characteristics of participants of this study as it relates to the program where they received their advanced pediatric dentistry education, program they are currently directing and the quality of the sedation training they received. 54% of PPDPDs received their advanced pediatric dental training in hospital-based programs, 38% in university-based programs and 8% in combined programs. 52% of respondents reported currently directing hospital-based programs, 27% reported directing combined programs and 21% university-based programs. There was slight increase in university postgraduate pediatric dentistry programs from the time PPDPDs received their education.

44% of PPDPDs reported receiving a "good" non-IV conscious sedation training, 29% reported receiving an "excellent" training. Nine participants (17%) stated receiving a "poor" sedation training and were all trained in hospital-based programs; four of them are currently directing hospital based PPDPs and five of them are currently directing university based-programs. Five respondents (10%) indicated they did not receive any non-IV conscious sedation training during their advanced pediatric education program: three of those PPDPDs were trained in hospital-based programs and two in university-based programs. Three of them are currently directing hospital based programs, one a combined program and one a university program.

3.2 Postgraduate Pediatric Dentistry Programs characteristics:

The mean number of residents enrolled in PPDPs was 11.4 (SD ± 13.2, range=2-100 residents). PPDPs with a duration of 2 years had an average of 6 residents per year and those of 3 years had an average of 3 per year. The mean number of non-IV sedation

that residents were required to care for was 24 (SD ± 16.70, range=0-50 sedation cases). The mean number of non-IV sedation that resident performed as the primary operatory was 37 (SD±24, range=0-150 cases) and the mean number of non-IV sedation residents were required to monitor was 24 (SD±13.4, range=0-60 cases).

3.3 Sedation Protocols

Figure 1: Bar graph of factors used for selection of patients for non-IV conscious sedation

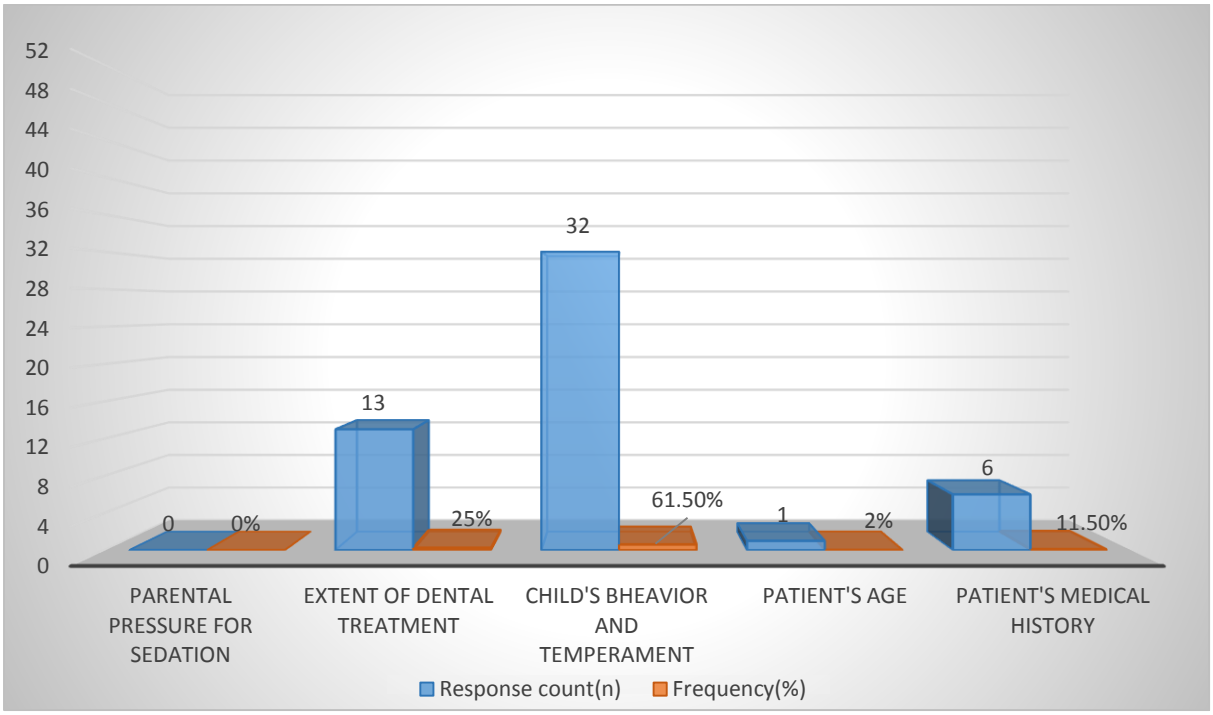


Figure 1 describes the factors used when selecting patients for non-IV conscious sedation. Respondents were asked to select the most important factor when selecting patients for non-IV sedation: 61.5% selected child's behavior and temperament.

The extent of dental treatment required ranked second (25%), the health status of the patient ranked third (11.5%), the age of the patient ranked second to last (1%) and the parental pressure for sedation ranked last (0%).

Table 2: Percentage of the patient population estimated to require sedation

	n	Frequency(percentage)
0-25%	33	63%
26-50%	18	35%
51-75%	1	2%
76-100%	0	0%

Table 3: Percentage of the patient population receiving sedation

	n	%
0-25%	47	90
26-50%	5	10
51-75%	0	0
76-100%	0	0

Tables 2 and 3 depict the percentage of patient population estimated and receiving non-IV conscious sedation respectively. 63% of respondents reported that 0-25% of the general population were predicted to qualify for sedation and 34.6% projected that 26-50% were candidate for sedation. When asked how many patients did received non-IV conscious sedation, 90% of participants reported that only 0-25% of the patient population actually received sedation and 10% reported that 26-50% of their patient population received sedation.

Figure 2: Most important factor when selecting the oral sedative agent for non-IV conscious sedation

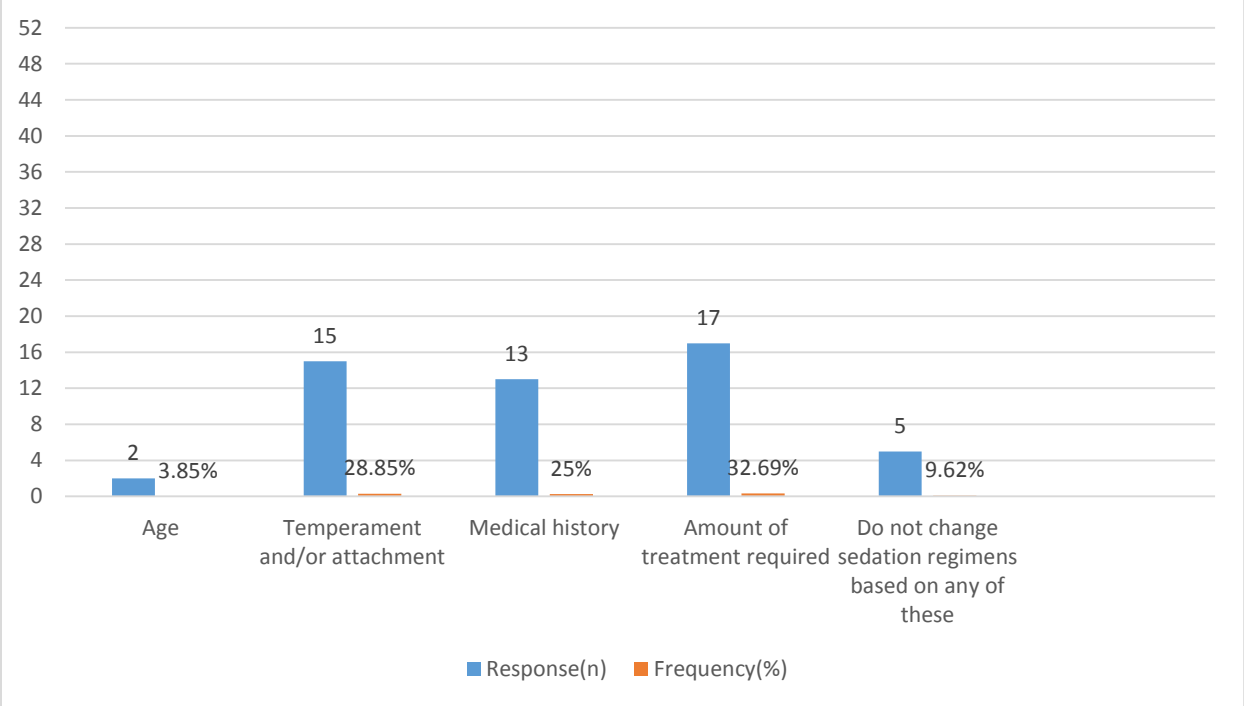
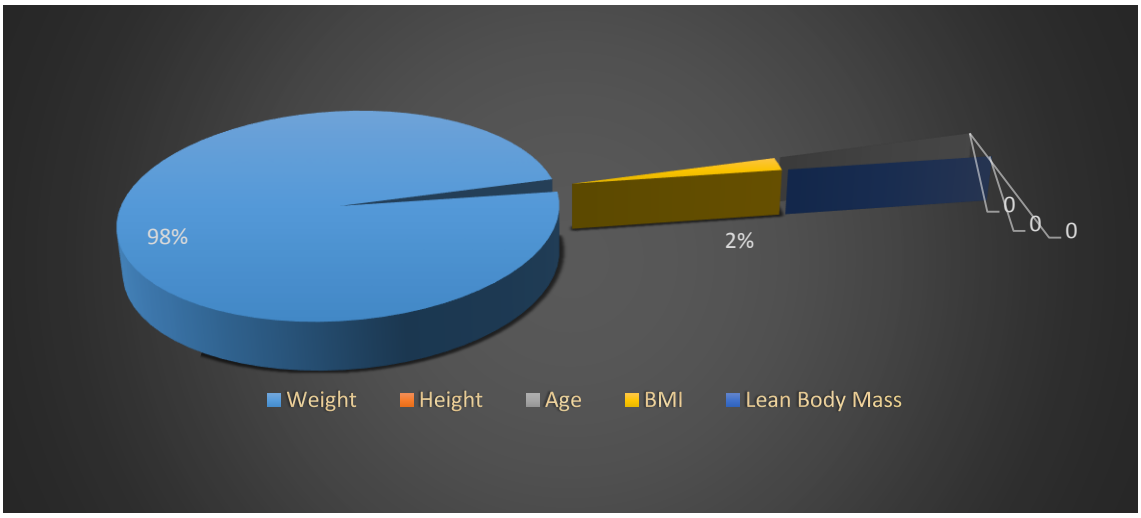


Figure 2 describes the most important factor reported by participants used when selecting the oral sedative agent for non-IV conscious sedation. The majority of the respondents (33%) reported selecting the sedative agent based on the amount of dental treatment required. 29% of the respondents reported selecting it based on the temperament and/or attachment of the patient, 25% reported selecting it based on the medical history and 3% reported selecting the drug based on the patients' age. 10% of respondents reported that they did not change the sedation regimen based on any of these factors.

Figure 3: Measures used to calculate the oral dosage of the sedative agent to be given to a pediatric patient



The pie chart in figure 3 shows that 51 of respondents reported using weight to calculate the oral dosage of the sedative agent to be given to pediatric patient while only 1 reported using the Body Mass Index (BMI).

Table 4: Percentage of patients requiring a pre-sedation evaluation

	n	%
0-25%	9	17%
26-50%	3	6%
51-75%	0	0%
76-100%	40	71%

Table 4 depicts the percentage of patients reported to require a pre-sedation evaluation at the PPDPs surveyed. 71% of PPDPDs reported that 76-100% of their patient population receiving sedation underwent a pre-sedation evaluation while 17% reported than less than 25% of their sedation patients received an evaluation.

Table 5: Total number of oral sedative agents routinely used with nitrous oxide inhalation sedation

	n	%
0	5	10%
1	18	35%
2	19	36%
3	8	15%
4 or more	2	4%

Table 5 shows the total number of oral sedative agents used routinely with nitrous oxide inhalation sedation. Most of the PPDPDs (36%) reported using 2 sedative agents with nitrous oxide. 35% of PPDPDS reported using 1 sedative agent and 4% reported using 4 oral sedative agents or more with nitrous.

Table 6: Common oral sedative agents used in PPDPs for non-IV conscious sedation

	n	%
Midazolam	50	96%
Diazepam	26	50%
Midazolam and Hydroxyzine	42	81%
Midazolam and Meperidine	18	35%
Chloral Hydrate and Meperidine	1	2%
Hydroxyzine and Meperidine	21	40%
Diazepam and Hydroxyzine	12	23%
Diazepam and Chloral hydrate	1	2%

Figure 4: Common oral sedative agents used for non-IV conscious sedation in PPDPs

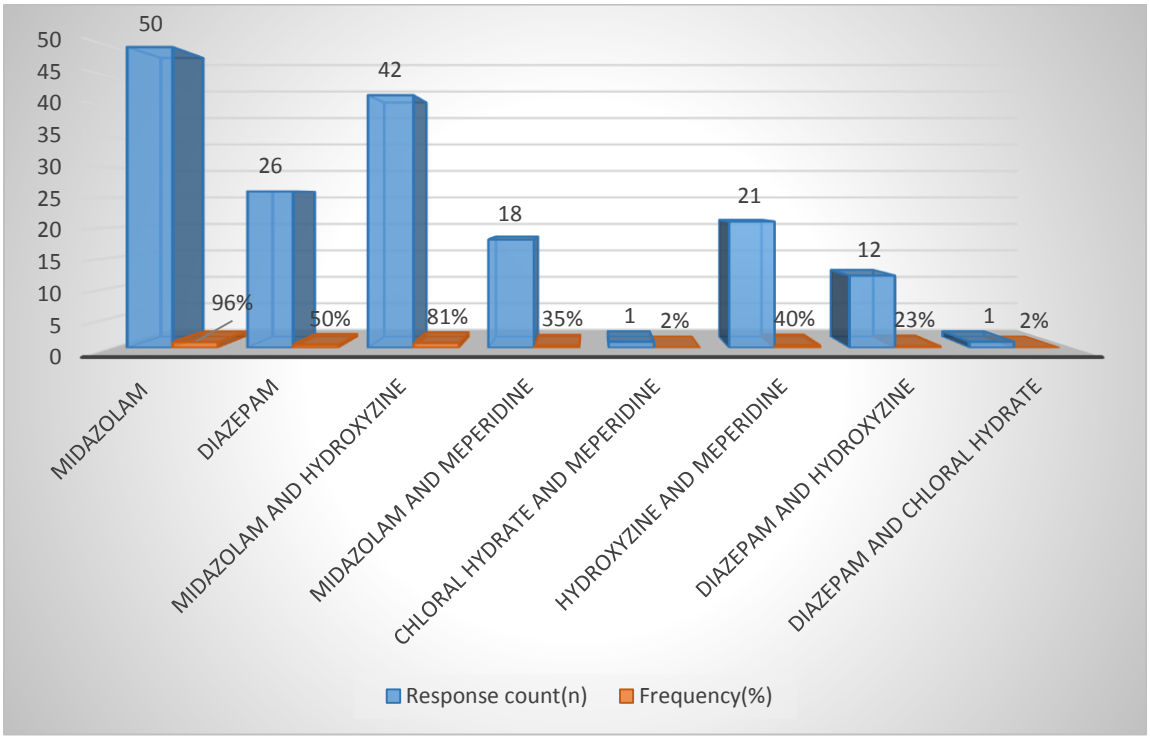


Table 6 shows that 96% of PPDPDs reported using midazolam alone when supervising oral non-IV conscious sedation and 81% reported using a combination of midazolam and hydroxyzine. 50% reported using diazepam alone, and only 2 reported using a combination of chloral hydrate with either meperidine or diazepam.

Table 7: Presence of a separate recovery area following non-IV conscious sedation

	n	%
Yes	22	43%
No	29	57%

Respondents were asked if their clinic facility was equipped with a separate recovery area for patients following non-IV conscious sedation. 57% of participating PPDPDs reported they did not benefit for a separate area for recovery while 45% reported they did.

3.4 Compliance of PPDPs with the AAPD sedation guidelines:

Table 8: PPDPs compliance with the AAPD Sedation Guidelines

Compliance with AAPD Sedation Guidelines		
Percentage of sedation patients requiring a pre-sedation evaluation	n	%
0-25%	9	17%
26-50%	3	6%
51-75%	0	0%
76-100%*	40	77%
Minimum number of chair side personnel (assistants/monitors) required to carry out mild sedation		
0	1	2%
1*	19	36%
2*	27	52%
3*	5	10%
Minimum number of chair side personnel (assitants/monitors) required to carry out moderate sedation		
0	0	0%
1*	9	17%
2*	34	65%
3*	9	17%
Minimum number of people (patients parents/caregivers) needed at your facility to accompany pediatric patients undergoing dental treatment under non-IV conscious sedation		
0	1	2%
1*	26	50%
2*	22	42%
3*	3	6%
Select the response that best applies to your program		
Our program utilizes a customized sedation recording sheet*	45	67%
Our programs utilizes the AAPD sedation recording sheet*	17	33%
Our program does not utilize a sedation recording sheet	0	0%
How often are sedation emergency drills performed on an average?		
Never	0	0%
Less than once per year*	4	8%
Once per year*	36	69%

Once per quarter*	10	19%
Once per month*	2	4%
Does your institution require supporting staff to have the current certifications?(select all that apply)		
Basic Life Support (BLS)*	51	98%
Pediatric Advanced Life Support (PALS)	1	2%
Advanced Cardiac Life Support (ACLS)	0	0%
Does your institution require supporting residents to have the current certifications? (select all that apply)		
Basic Life Support (BLS)*	49	94%
Pediatric Advanced Life Support (PALS)*	52	100%
Advanced Cardiac Life Support (ACLS)*	9	17%
Which of the following is needed to carry out sedations at your facility? (select all that apply)		
Emergency Oxygen Tank*	52	100%
Nasopharyngeal and/or oropharyngeal airways*	50	96%
Reversal Agent*	50	96%
Size appropriate suction cathethers*	47	90%
Endotracheal tubes*	40	77%
Stylets*	36	69%
Face mask or bag-valve mask*	51	98%
Are the following monitors used for sedation at your institution?(select all that apply)		
Pulse oximeter*	51	98%
Precordial stethoscope	41	79%
Electrocardigram (EKG or ECG)	20	38%
Blood pressure sphygmanometer*	46	88%
Capnograph	22	42%
Temperature probe	12	23%
Clinical assessment of the patient*	51	98%
	n/%	n/%
Do the following represent an absolute contraindication for dental treatment under non-IV conscious sedation?	YES	NO
Children in ASA I*	2/4%	48*/92%
Children in ASA II*	5/10%	45*/86%
Children in ASA III*	47/90%	3/6%*
Which of the following evaluations are used when discharging a pediatric patient after sedation? (select all that apply)	n	%
Ability to walk*	45	86%

Ability to talk*	44	85%
Ability to stay awake for 20 minutes in a quiet room*	35	67%
Ability to void*	5	96%
Ability to drink*	32	61%
Does your institution use a written discharge protocol?		
Yes*	48	94%
No	3	6%
Does your institution use a quality assurance protocol for adverse related sedation event?		
Yes*	47	92%
No	4	8%

*indicates correct answer

Participants were asked 14 questions related to their didactic and clinical experiences when conducting non-IV conscious sedation. Each correct answer was awarded a point of 1 and incorrect answers were given a point of 0. Questions 14, 15,16,17,20, 21, 24, 31, 32, 33, 34 were all given a point for each correct answer. Question 25 was given 2 points, one point each for the correct answer. Questions 26 and 27 were given 7 and 3 points respectively for correct answers. The overall maximum was of 23 and minimum was of 13. The mean for the compliance of PPDPs with the AADP sedation guidelines was of 20.6 (SD±1.6, range 13-23 points).

3.5. Compliance of PPDPs with the CODA Sedation Standards:

Table 9: Compliance of PPDPs with the CODA Sedation Standards

Compliance with CODA sedation Standards		
Number of non-IV conscious sedation cases the average resident cares for	n	%
<25	11	21%
25*	8	15%
>25*	33	63%
Number of non-IV conscious sedation cases the average resident monitors		

<25	21	40%
25*	18	34%
>25*	13	25%

Does your institution require supporting staff to have the current certifications?		
Basic Life Support (BLS)	51	98%
Pediatric Advanced Life Support (PALS)*	1	2%
Advanced Cardiac Life Support (ACLS)*	0	0%
Does your institution require supporting residents to have the current certifications?		
Basic Life Support (BLS)*	49	94%
Pediatric Advanced Life Support (PALS)*	52	100%
Advanced Cardiac Life Support (ACLS)*	9	17%

Both Tables 8 and 9 describe the proportion of PPDPDs that gave their answers to the scoring criteria related to the CODA sedation standards. Table 8 was used since the CODA Accreditation Standards for Advanced Specialty Education Programs in Pediatric Dentistry specifies that by being compliant, PPDPs need to first "be compliant with the AAPD sedation guidelines." [29] The overall maximum CODA compliance score was of 28 and the minimum was of 13. The mean for the compliance of PPDPs with the CODA sedation guidelines was of 24.2 (SD±2.7, range 13-28 points).

3.6. Facilitators for the provision of more non-IV conscious sedation

Figure 5: Facilitators for provision of more non-IV conscious sedation cases in PPDPs

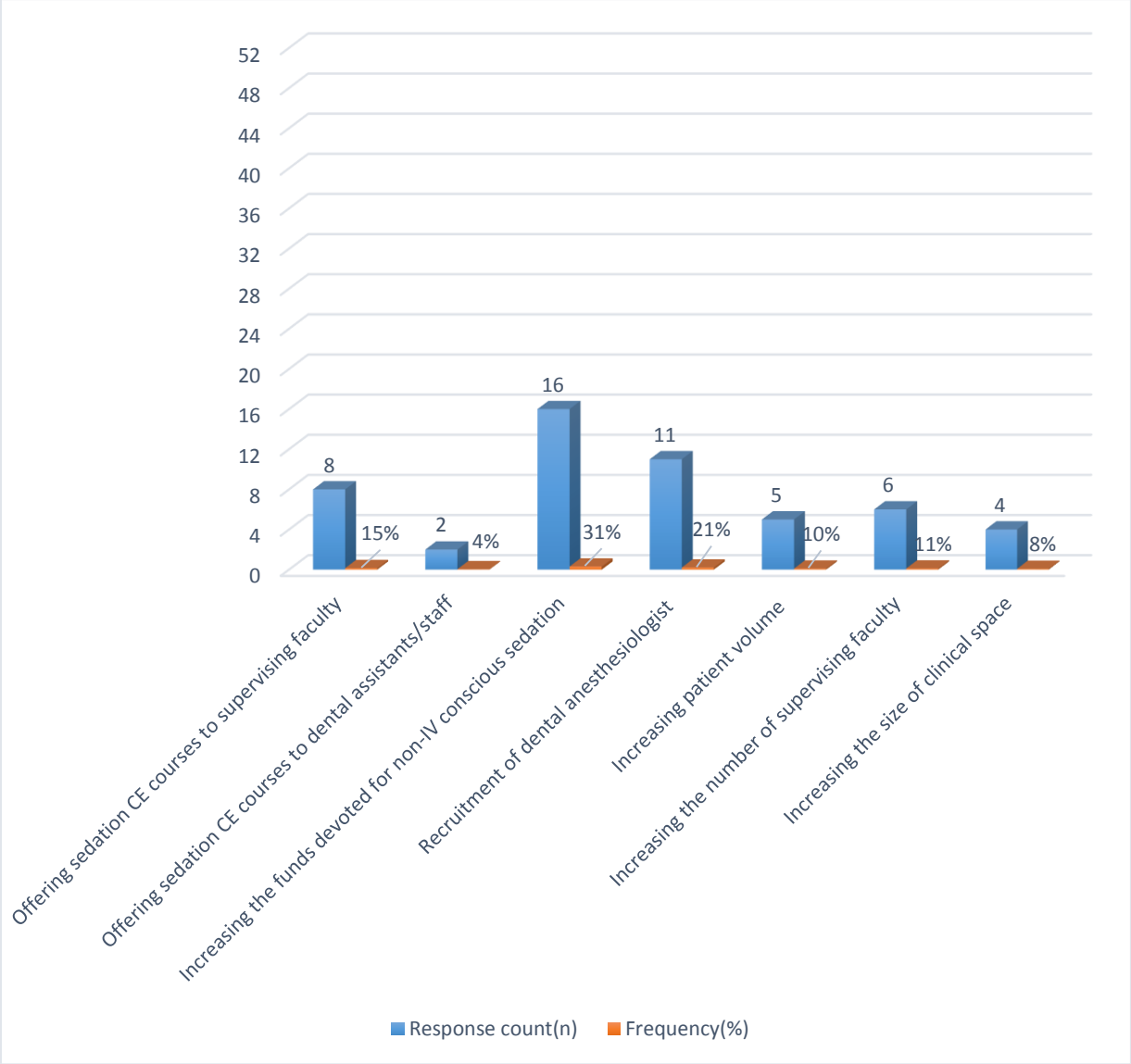


Table 10: Facilitators for the provision of more non-IV conscious sedation cases

	n	%
Offering sedation CE courses to supervising faculty	8	15%
Offering sedation CE courses to dental assistants/staff	2	4%
Increasing the funds devoted for non-IV conscious sedation	16	31%
Recruitment of dental anesthesiologist	11	21%
Increasing patient volume	5	10%
Increasing the number of supervising faculty	6	11%
Increasing the size of clinical space	4	8%

Figure 5 and table 10 depict facilitators reported by PPDPDs to allow for the provision of more non-IV conscious sedation cases. The majority of PPDPDs (31%) reported that increasing the funds devoted for non-IV conscious sedation would permit for the provision of more non-IV conscious sedation experiences for residents. Recruitment of a dental anesthesiologist and offering CE courses for the supervising faculty ranked respectively second and third as facilitators.

3.7. Barriers faced by PPDPDS for the provision of more non-IV conscious sedation cases

Figure 6: Barriers for non-IV conscious sedation cases

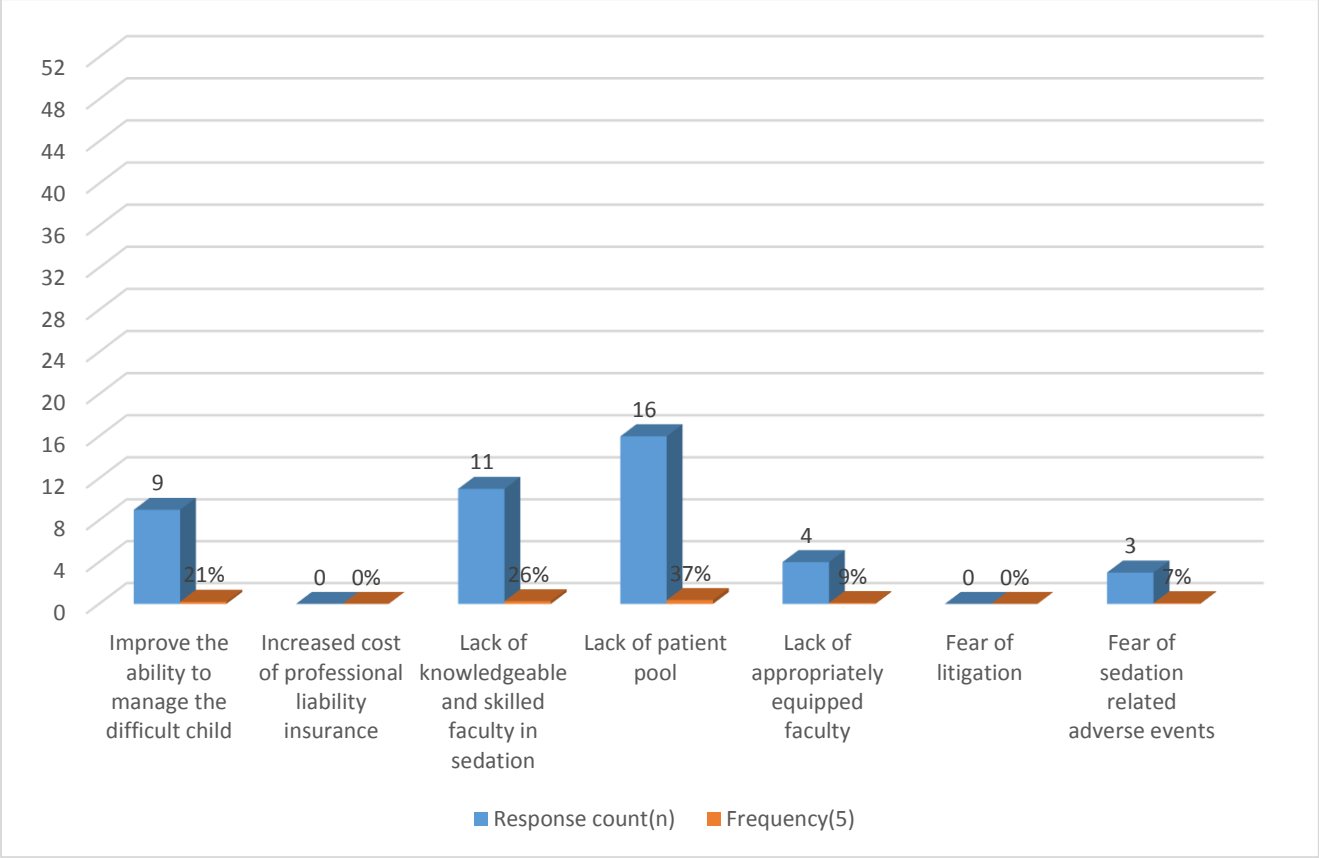


Table 11: Barriers faced for the provision of more non-IV conscious sedation cases:

	n	%
Improve the ability to manage the difficult child	9	21%
Increased cost of professional liability insurance	0	0%
Lack of knowledgeable and skilled faculty in sedation	11	26%
Lack of patient pool	16	37%
Lack of appropriately equipped facility	4	9%
Fear of litigation	0	0%
Fear of sedation related adverse events	3	7%

Table 11 describes the various barriers viewed by PPDPDs to hinder the provision of more non-IV conscious sedation cases. 37% of respondents rated the lack of patient pool as the number one reason for not providing residents with enough non-IV conscious sedation cases. The lack of knowledgeable faculty as well as the improved ability to manage the difficult child ranked respectively second and third as barriers faced. 7% of PPDPDs reported that the fear of sedation related adverse events was responsible for not proving enough non-IV conscious sedations. Finally, the fear of litigation as well as the increased cost of liability insurance ranked last as barriers, both scoring a response rate of 0%.

3.8 Changes in the didactic sedation curricula and sedation clinical experiences required of PPDPs since the previously published AAPD sedation guideline (2011):

Table 12: Current v/s Past PPDPs sedation didactic and clinical curriculums

		2015 Survey		2009 Survey			
		n	%	n	%	χ 2	p(value)
Use of a written protocol for sedation	Yes	14	87%	27	93%	χ 2 (1)=0.38	p=0.611
	No	2	13%	2	7%		
Monitors used during sedation							
Pulse oximeter	Yes	51	98%	28	100%	χ2 (6)=0.53	p=0.530
	No	1	2%	0	0%		
Precordial stethoscope	Yes	41	79%	25	89%		
	No	9	17%	3	11%		
EKG/ECG	Yes	20	38%	10	36%		
	No	29	75%	18	64%		
BP cuff	Yes	46	88%	25	89%		
	No	3	6%	3	11%		
Capnograph	Yes	22	42%	10	36%		

	No	29	56%	18	64%		
Temperature probe	Yes	12	23%	4	14%		
	No	35	67%	24	86%		
Clinical assessment	Yes	51	98%	24	86%		
	No	1	2%	4	14%		
Written Discharge Protocol	Yes	48	94%	29	98%	χ 2(1)=0.02	p=0.877
	No	3	6%	1	2%		
Sedation ER drills							
Never		0	0%	1	3%		
<1/yr		4	8%	5	17%	χ 2 (4) =8.56	p=0.05*
1x/yr*		36	69%	11	38%		
4x/r		10	19%	10	34%		
12x/yr		2	4%	2	7%		
Number of oral sedative used with Nitrous Oxide	0	3	6%	0	0%	χ 2(4)=4.93	p=0.30
	1	18	37%	8	28%		
	2	18	37%	16	58%		
	3	8	16%	4	14%		
	≥4	2	4%	0	0%		

* indicates results that are statistically significant

Respondents were asked 5 items related to their sedation protocols that were similar to a survey done in 2009 by Pope-Ozimba (non-published data). [27] Chi square tests were conducted after a Monte-Carlo simulation and a Yates correction factor for the small cell sizes were performed, in order to determine whether there was any statistical differences between any of the 6 items answers in 2009 and 2015. The number of sedation emergency drills performed once a year was statistically significantly higher in 2015

compared to the ones performed in 2009. There was no statistical significant difference between the monitors used during the provision of non-IV conscious sedation, the use of a written discharge protocol, a sedation protocol, and the number of oral sedative agents used in combination with nitrous oxide inhalation sedation.

3.9. Compliance with AAPD sedation standards as it relates to PPDPD and PPDP parameters:

A total score of compliance was given to each respondent based on questions number 14,15,16,17,20,21,24,25,26,27,31,32,33 and 34. See section 3.3. Kruskal-Wallis tests for non parametric data were used to determine if there were a statistical significant differences between AAPD sedation compliance and the 3 parameters relating to PPDPs: setting where the PPDPDs received their education, their self-reported quality of sedation training they received and the setting of the program they were currently directing.

Table 13: Distribution of AAPD sedation compliance based on PPDPDs education setting:

	n	Mean (compliance score)	Standard Deviation
Hospital based	28	21	1.9
University based	4	21.5	0.6
Combined program	20	20	2.3

Table 14: Distribution of AAPD sedation compliance based on PPDPDs self-reported quality of non-IV conscious sedation training:

	n	Mean (compliance score)	Standard Deviation
None	5	21.6	0.5
Poor	9	21.2	1.4
Good	23	19.9	2.6
Excellent	15	21.3	1.2

Table 15: Distribution of AAPD sedation compliance based on PPDPs settings:

	n	Mean (compliance score)	Standard Deviation
Hospital based	27	21	1.9
University based	11	21.3	0.9
Combined program	14	19.6	2.5

Table 13,14,15 depict the means for all of the AAPD sedation compliance scores based on setting where PPDPDs received their education, the self-reported quality of their training and finally the setting of the program they were currently directing.

Table 16: Bivariate relationship of compliance with AAPD sedation guidelines and PPDP and PPDPD's parameters

	n	df	p value
PPDPD parameters			
Settings where they received their pediatric dental training (Hospital/University/Combination)	52	2	0.6
Self-reported quality of their non-IV conscious sedation training(None/Poor/Good/Excellent)	52	3	0.05
PPDP parameters			
Current setting (Hospital/University/Combination)	52	2.1	0.34

Table 16 describes the bivariate relationship between AAPD sedation guidelines and both PPDPD and PPDP parameters. There were no statistically significant difference between the education PPDPDs received and the compliance of their programs with AAPD sedation guidelines. Likewise, there were no statistically significant difference between

program settings and the compliance. The quality of the sedation education of PPDPDs did not seem to affect the compliance of the program they were directing, and the setting of the programs they graduated from did not influence it either.

3.10 Compliance with CODA standards:

The compliance with the CODA standards was assigned a score. See section 3.5. The higher the score the more compliant was the PPDP with the CODA 2013 sedation standards.

Table 17: Distribution of CODA sedation standard compliance based on PPDPDs education setting:

	n	Mean (compliance score)	Standard Deviation
Hospital based	28	23.8	4.6
University based	4	25.2	0.5
Combined program	20	23.45	3.2

Table 18: Distribution of CODA sedation standard compliance based on PPDPDs self-reported quality of non-IV conscious sedation training:

	n	Mean (compliance score)	Standard Deviation
None	5	25	0.7
Poor	9	24.7	1.9
Good	23	22.1	5.2
Excellent	15	25.5	1.5

Table 19: Distribution of CODA sedation standard compliance based on PPDPs current settings:

	n	Mean (compliance score)	Standard Deviation
Hospital based	27	23.8	3.5
University based	11	24.9	1.2
Combined program	14	22.9	5.7

Table 20: Bivariate relationship of compliance with CODA sedation guidelines and PPDP and PPDPDs parameters

	n	df	p value
PPDPD parameters			
Settings where they received their pediatric dental training (Hospital/University/Combination)	52	2	0.3
Quality of their non-IV conscious sedation training(None/Poor/Good/Excellent)	52	3	0.01*
PPDP parameters			
Current setting (Hospital/University/Combination)	52	2	0.61

* indicates results that are statistically significant

Table 20 shows that no statistical significant difference existed between the setting of PPDPs and their compliance with the CODA sedation standards. The settings where PPDPDs received their pediatric dental education did not affect their compliance with CODA either. However, the quality of the training PPDPDs received had a statistically significant difference where PPDPDs reporting to have an “excellent sedation training” rated higher on the overall CODA sedation compliance score.

3.11 Attitudes of PPDPDs on the 2013 CODA sedation standards:

Figure 7: Bar graph depicting the attitudes of PPDPDs toward the current CODA standards and state dental board regulations

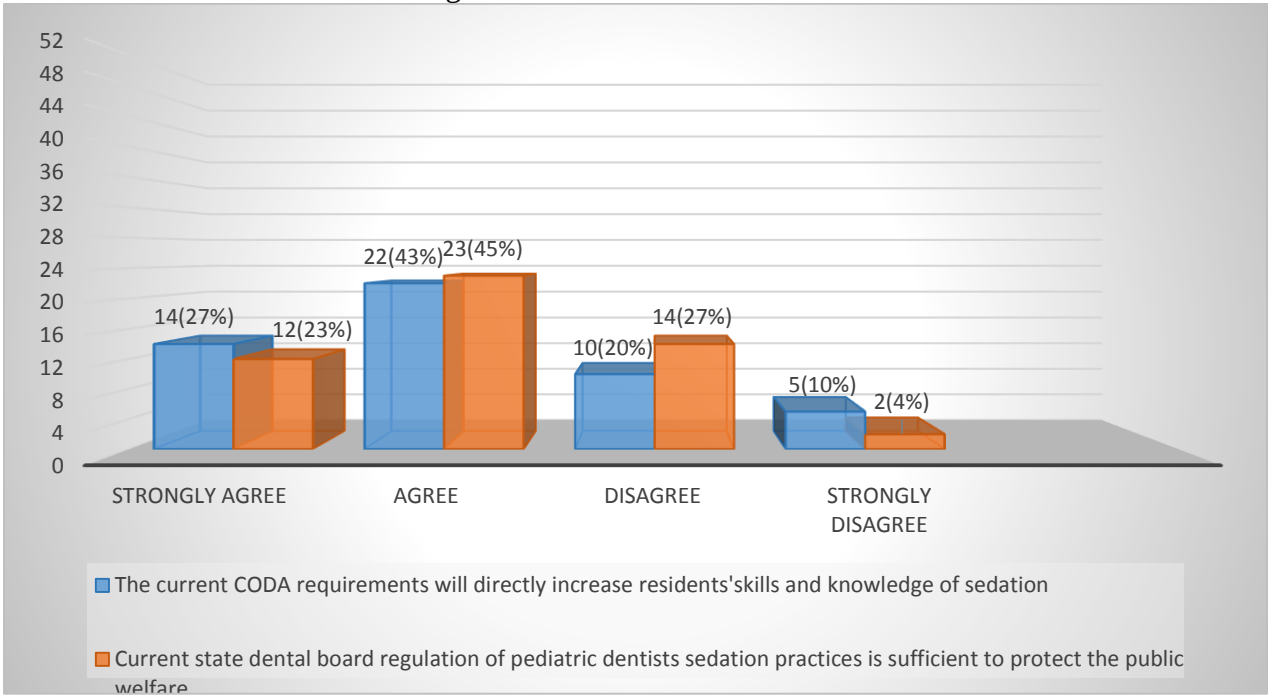
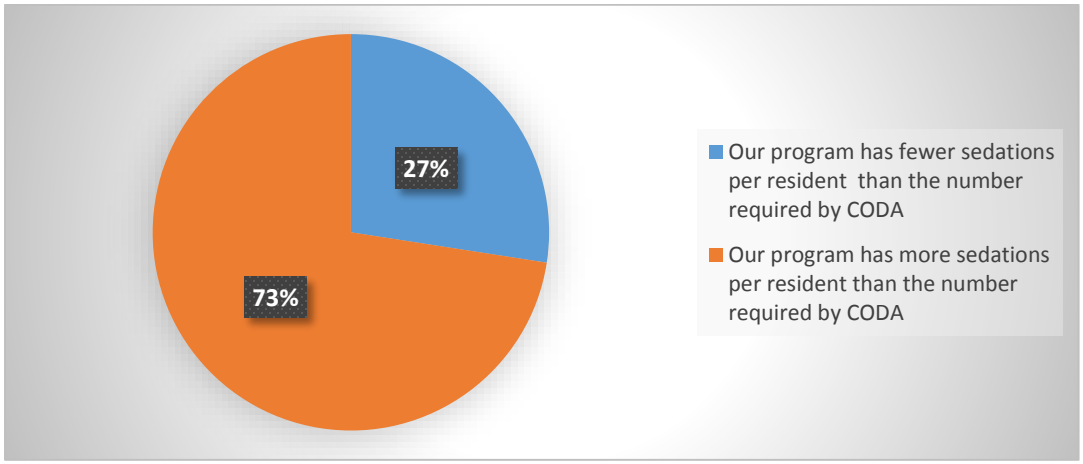


Figure 7 illustrates the number of PPDPDs reporting that they strongly agreed, agreed, disagreed or strongly disagreed with the following statements: the current CODA requirements will directly increase residents' skills and knowledge of sedation and current state dental board regulation of pediatric dentists' sedation practices is sufficient to protect the public welfare.

51 responses were obtained from which the majority (43% and 45%) agreed with both statements. 27% of surveyed PPDPDs strongly agreed that the 2013 CODA sedation requirement increased residents 'skills and knowledge of sedation while 20% disagreed

and 10% strongly disagreed with the above statement. 27% of respondent disagreed that current state dental board were sufficient to protect the public welfare while 23% agreed with this statement.

Figure 8: Pie chart of the sedation number per resident compared to the CODA required number



73% of surveyed PPDPDs reported that their program had more sedations per resident than the number required by CODA (n=25), while 27% responded that their program had less than twenty sedations per resident.

3.12 PPDP setting and number of patients receiving non-IV conscious sedation and number of sedation ER experienced per year:

Figure 9: PPDP setting and number of patients receiving non-IV conscious sedation

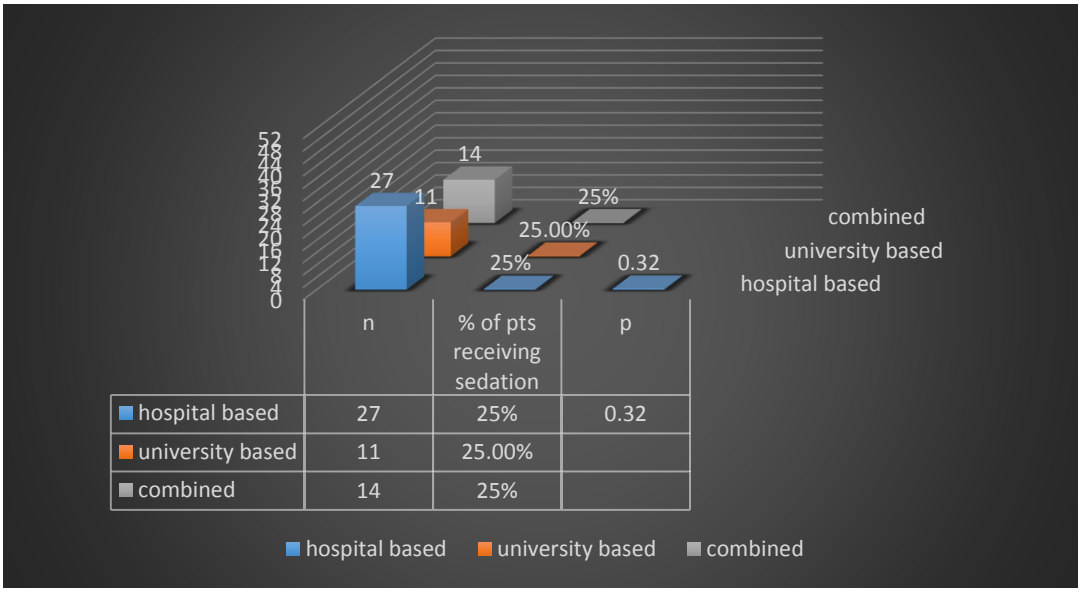
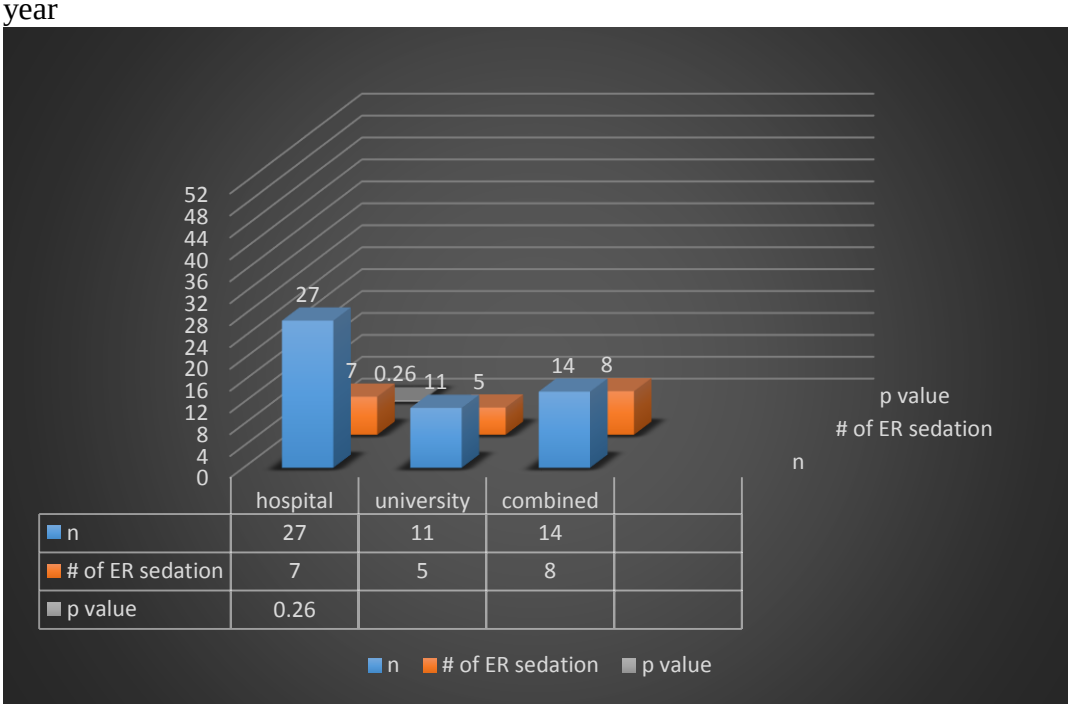


Figure 10: PPDP setting and number of sedation related emergencies experienced by year



Both Figures 9 and 10 show that there is no statistical significant difference between PPDP setting (hospital based/university/combined) and the number of patients who were receiving non-IV conscious sedation as well as the number of sedation related emergencies experienced per year.

Discussion:

Standardization in the sedation guidelines across the United States is still lacking.[33] The American Academy of Pediatric Dentistry provides recommendations for more standardized dental sedation practices in a hope to lower the mortality and morbidity of the pediatric dental patient. Previous studies on the experiences of postgraduate pediatric dental residencies with non-IV conscious sedation have shown that only a small number of programs had implemented the AAPD guidelines when delivering sedation.[3] In 2014, the Commission of Dental Accreditation increased the sedation curriculum requirements for residents enrolled in PPDPs from twenty five to fifty patient encounters.[29] A better understanding of the compliance in 2015 of postgraduate pediatric dentistry programs with both the AAPD and CODA sedation standards is needed. Therefore, the national PPDP non-IV conscious sedation protocols, experiences, and curricula were assessed in this study. PPDP compliance, or lack thereof, with the AAPD sedation guidelines and CODA standards were defined. The impact of the 2011 AAPD sedation guidelines on programs' practices was examined and the independent association of selected PPDP setting variables with compliance of the AAPD guidelines and CODA standards were ascertained. Hospital-Based programs that are subject to the

strict Joint Commission on Accreditation of Healthcare Organizations (JCAHO) regulation were assumed to be more compliant with both CODA and AAPD sedation guidelines and the hypothesis was tested.

Of the 14 items used to assess compliance with the AAPD sedation guidelines, findings indicate that on average, participants were compliant with a mean of 20.6 ±1.6 (mean ± SD). Only one program received a compliance score of 13 and most programs scored around 19 to 23; 23 being the highest score representing the highest compliance with the AAPD sedation guidelines. The CODA sedation standards compliance had a mean score of 24.2 ± 2 (mean ± SD) for all PPDPs with a maximum of 28 and a minimum of 19. The higher mean score is related to having more items used to assess the CODA sedation standards. Not only does CODA recommend PPDPs to conduct non-IV conscious sedation in accordance to the AAPD sedation guidelines, but it also puts a required number of patient encounters for residents of twenty five as a primary operator and twenty five as a monitor. [29] Surveyed PPDPDs did report an average of 37 cases where residents were the primary operator (SD±24, range: 0-150), an average of 24 cases that residents were required to care for (SD±17, range: 0-50) and an average of 24 cases where residents monitored (±SD 13, range: 0-60). Overall, programs were compliant with this specific standard set by CODA. Residents were able to perform 25 or more non-IV conscious sedation cases as a primary operator in 77% of the PPDPs. 33% of PPDPDs reported that their residents were not able to meet the CODA sedation number of twenty five.

When comparing didactic and curriculum experiences of surveyed PPDPDs in 2015 to the ones in 2009, it is interesting to note that the current study's results regarding some of the teaching policies in sedation are similar to the previous study of program directors (non-published data).[27] For example, no statistical significant differences were found in the number of oral sedative agents used in combination with nitrous oxide inhalation sedation. Most of the respondents (74%) stated using 1 to 2 oral sedative agents in combination with nitrous oxide. There was also no statistical significant difference in the use of a written sedation protocol, a written discharge protocol, and the sedation monitors used. In fact, the most commonly used monitors remained the pulse oximeter, the blood pressure sphygmanometer, and the clinical assessment of the patient. There was an increase in the use of the capnograph and temperature probe since 2009 however that increase was not statistically significant ($p=0.42$).

The most widely used oral sedative agent remains midazolam. In this study, 96% of PPDPDs reported using midazolam alone when supervising oral non-IV conscious sedation and 81% reported using a combination of midazolam and hydroxyzine. 50% reported using diazepam alone and only 2 reported using a combination of chloral hydrate with either meperidine or diazepam. These finding are very similar to previous studies where midazolam and hydroxyzine retain their popularity as oral sedative agents while meperidine and chloral hydrate use decreases.[36-38] A recent Cochrane study by Laurenceau-Matharlu et al. assessing oral sedative agents, dosages and regimens concluded that from all the sedative agents available, "only oral midazolam showed weak evidence as an effective sedative agent for children undergoing dental treatment."[39] In

"Pediatric Chloral Hydrate Poisonings and Death Following Outpatient Procedural Sedation" published in 2014, Nordt et al. goes further in stating that "Chloral hydrate is an older medication, which in our opinion should no longer be used for procedural sedation in patients of any age.[40] Choral hydrate is associated with significant adverse effects, including death, and safer alternatives for pediatric procedural sedation should be sought and utilized." [40]

The results of the present study do highlight the radical unpopularity of chloral hydrate, once upon a time the most widely used oral sedative agent in PPDPs. [41] Hydroxyzine, on the contrary, has gained further acceptance in teaching programs. The results of a previous similar study in 2009 (non-published data) ranked diazepam as the second favorite oral agent following midazolam and hydroxyzine was rated third.[27] In this study, the combination of hydroxyzine and midazolam was used by 81% of respondents in contrast to diazepam which was used by 50% of participating PPDPDs.

The AAPD states in the "Monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures" that sedation emergency drills ought to be performed "regularly" but does not specify a time interval.[2] When comparing the results of this study to the similar study done in 2009 (non published data), it was found that the number of emergency sedation drills performed once a year showed a statistical significant difference from 2009 to 2015 with an increase in emergency sedation drills in PPDPs nowadays ($p=0.05$). This may be the influence of the Commission on Dental Accreditation increase of the sedation required number from twenty five to fifty per resident. Postgraduate pediatric dentistry program directors might

be more inclined to encourage their residents to fulfill the new CODA sedation number by providing more non-IV conscious sedation encounters and sedation ER drills during clinic time. A recommendation for the AAPD would be to increase the number of sedation emergency drills required per year by specifying a time interval.

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When the hypothesis that hospital-based program subject to JCAHO were more compliant with AAPD sedation guidelines was tested, it was found in the bivariate analysis that the setting of postgraduate pediatric dentistry program did not affect the compliance of the program with the AAPD sedation guidelines. One, however, should bear in mind that combined programs do have a hospital component to them in addition to the university component. For the purpose of this study, PPDPs that were solely hospital based were considered as "hospital-based programs." These results of this study are slightly contradictory with the results of a national survey conducted in 2012 by Johnson et al. where residents from hospital-based programs were reported to be "more inclined to practice non-IV conscious sedation upon graduation."[17] Perhaps, the present study suggests that both combined programs and university based programs provide sedation trainings that are as satisfactory as the ones provided in hospital based programs. Similarly, the majority of the programs surveyed were found to be compliant with the AAPD sedation guidelines (mean 20.6 ± SD 2).

The self-reported sedation training quality of PPDPDs (none, poor, good, excellent) did not have an influence on the compliance of their programs ($p=0.05$) with the AAPD sedation guidelines. Also, there was no statistically significant relationship

between the type of setting postgraduate pediatric dentistry program directors received their education (hospital based, university based, combination) and the compliance of the program they directed with the AAPD sedation guidelines (p=0.6).

When compliance with the CODA sedation standards was analyzed based on PPDP settings and PPDPDs parameters, no statistical significant difference was found between the current settings of PPDPs and the setting where PPDPDs received their training (p values= 0.3 and 0.61 respectively). The quality of the training of postgraduate pediatric dentistry program directors did however have a statistical significant difference on the compliance of the respective programs with the CODA compliance, where directors that stated receiving an "excellent sedation training" were more likely to be more compliant with the CODA sedation standards (p=0.01). Johnson et al. assessed the likelihood of residents to practice sedation based on the quality of their sedation training and his results are parallel to the results from this study where residents who rated their training in non-IV conscious sedation "good to excellent" were more disposed to practice sedation.[17]

In this study, a major perceived barriers for surveyed participants to increase the number of non-IV conscious sedation experience of residents they supervised was a lack of patient pool (37%). Other perceived barriers selected by the participants were insufficient training on non-IV conscious sedation of faculty (26%). Clearly, the surveyed PPDPDs recognize a need for training of faculty by offering additional Continuing Education courses related to sedation (15%) as well as a need to increase the funds

devoted for sedation in the pediatric dental departments (31%). We failed to specify to participants what would the funds be devoted for. Adequate conscious sedation training ought to be considered if PPDPs want to attract competent candidates to apply for their programs. In fact, a study done by Da Fonseca et al. on the factors and program characteristics that influenced pediatric dentistry applicants to rank US residency programs stated that "approximately 44% of first-year residents (class of 2005) reported the amount of sedation experience" as a critical factor influencing their choice of which pediatric dentistry program they will apply for.[18] Furthermore, the increase in number of CODA sedation standard in 2013 reinforces the need for programs to devote the appropriate funds for sedation.

The challenge remains though that there is no standardization of sedation practices, guidelines and credentialing between the AAPD, CODA and the state dental board regulations on sedation. A recommendation for the AAPD, other affiliated organizations and state dental boards would be to consult together to develop new guidelines for sedation of the pediatric dental patient that are precise and can meet the state dental board requirements for sedation. An important topic for future research would be to evaluate the standardization between state dental board regulations regarding non-IV conscious sedation and their impact of PPDPs in the United States.

Even though the response rate was high (70%), results obtained in this study suffer from being subjective data based on self-reported data from postgraduate pediatric dentistry program directors.

CONCLUSION:

- The AAPD 2011 Sedation guidelines have allowed for standardization of sedation practices across PPDPs in the United States.
- PPDPD training setting did not affect the compliance of the programs they were directing with the AAPD sedation guidelines and the CODA sedation standards.
- PPDP setting did not affect the compliance of the program with both the AAPD and CODA sedation guidelines.
- The self-reported quality of the sedation training of PPDPDs did not affect the compliance of the programs they were directing with the AAPD sedation guidelines.
- PPDPs with PPDPDs who reported an "excellent" sedation training were more likely to be more compliant with the CODA sedation guidelines.
- PPDP setting did not affect the number of patients receiving non-IV conscious sedation or the number of sedation ER experienced per year.
- Most PPDPs are compliant with both the AAPD and CODA sedation standards.
- Most PPDPDs are in favor of the 2013 increase number of sedation required by CODA.

Appendix A:

Postgraduate Pediatric Dentistry Program Director Survey

1) How many years have you been employed at your current position? (postgraduate pediatric dentistry program director at your particular program)? ☐☐

The following items apply to your own training:

2) Which setting best defines the program where you received your advanced pediatric dentistry training? (Select one option only)
○1 Hospital based
○2 University based
○3 Combined program

3) Please describe the quality of the sedation training you received during your advanced pediatric dentistry training?

1	**2**	**3**	**4**
○	○	○	○
None	Poor	Good	Excellent

The following questions pertain to the program where you currently work:

4) How many residents are enrolled in your program? ☐☐

5) Which setting best defines your program? (Select one option only)

○1 Hospital based
○2 University based
○3 Combined program

6) How many cases of non-IV sedation are residents required to care for? ☐☐☐

7) How many cases of non-IV sedation does the average resident actually does? ☐☐☐

8) How many cases of non-IV sedations does the average resident monitor? ☐☐☐

9) Which **one** of the following factors is the **most** important factor for selection of patients receiving non-IV conscious sedation? (Select one response)

○1 Parental pressure for sedation
○2 Extent of dental treatment required

○3 Child's behavior and temperament
○4 Patient age

10) What percentage of your patient population would you estimate, qualifies for sedation? (100% denotes all patients)

○1 0-25
○2 26-50
○3 51-75
○4 76-100

11) What percentage of your patient population actually receives sedation? (100% denotes all patients)

○1 0-25
○2 26-50
○3 51-75
○4 76-100

12) Which **one** of the following is the **most** important in selecting a sedation agent at your program? (Select one response)

○1 Age
○2 Temperament and/or attachment
○3 Medical history
○4 Amount of treatment required
○5 Do not change sedation regimens based on any of these

13) Which **one** of the following do you use to calculate the oral dosage of the sedation agent to be given to a pediatric patient? (Select one response)

○1 Weight
○2 Height
○3 Age
○4 BMI
○5 Lean Body Mass

14) What percentage of patients at your facility requires pre-sedation evaluation, if needed?

○1 0-10
○2 11-20
○3 21-50
○4 51-75
○5 75- 100

15) What is the minimum number of chair side personnel (assistants/monitors) required at your facility to carry out the procedure under **mild sedation?** ☐☐

16) What is the minimum number of chair side personnel (assistants/monitors) required at your facility to carry out the procedure under **moderate sedation**? ☐☐

17) What is the minimum number of chair side personnel (assistants/monitors) needed at your facility to accompany pediatric patient for dental treatment under **non-IV sedation**? ☐☐

18) What is the total number of sedative agents that is used routinely with nitrous oxide sedation? ☐☐

19) Are the following sedation agents commonly used at your institution?	**Yes**	**No**
Midazolam alone	○1	○2
Diazepam alone	○1	○2
Meperidine alone	○1	○2
Combination of midazolam and other agent	○1	○2
Combination of diazepam and other agent	○1	○2
Combination of meperidine and other agent	○1	○2
Chloral hydrate alone	○1	○2
Hydroxyzine alone	○1	○2
Combination of hydroxyzine	○1	○2
Combination of chloral hydrate	○1	○2

20) How often are sedation emergency drills performed at your institution?

○1 Never
○2 Less than once per year
○3 Once per year
○4 Once per quarter
○5 Once per month

21) How many sedation emergencies has your program experienced from January 2008 to January 2011?

○1 0-5
○2 6-10
○3 11-15
○4 16-20
○5 21-25
○6 >25

22) How many sedation emergencies has your program experienced since January, 2011?

○1 0-5
○2 6-10
○3 11-15
○4 16-20
○5 21-25
○6 >25

23) Does your institution require supporting staff to have the following current certifications?	Yes	No	24) Does your institution require residents to have the following current certifications?	Yes	No
Basic Life Support (BLS)	○1	○2	Basic Life Support (BLS)	○1	○2
Pediatric Advanced Life Support (PALS)	○1	○2	Pediatric Advanced Life Support (PALS)	○1	○2
Advanced Cardiac Life Support (ACLS)	○1	○2	Advanced Cardiac Life Support (ACLS)	○1	○2

25) Select the response that best applies to your program

○1 My residents utilize the American Academy of Pediatric Dentistry Sedation Recording Sheet
○2 My residents utilize a customized sedation recording sheet
○3 Other

26) Which of the following is needed to carry out sedations at your facility? (Please respond y/n to each)	Yes	No

Emergency Oxygen Tank	○1	○2
Nasopharyngeal and/or oropharyngeal airways	○1	○2
Reversal agent	○1	○2
Size-appropriate suction catheters	○1	○2
Endotracheal tubes	○1	○2
Stylets	○1	○2
Face mask or bag-valve mask	○1	○2

27) Are the following monitors used for sedation at your institution?	**Yes**	**No**
Pulse oximeter	○1	○2
Precordial stethoscope	○1	○2
EKG	○1	○2
Blood pressure sphygmomanometer	○1	○2
Capnograph	○1	○2
Temperature probe	○1	○2
Clinical observation of the patient	○1	○2

28) At your institution, do you provide specific monitor training, if no skip to question 30?
○1 Yes
○2 No

29) Regarding the response to Q29a, how many hours of training are provided? □□□

30) Do you have a standardized and written protocol for sedation?

○1 Yes
○2 No

31) Do the following represent an absolute contraindications for dental treatment under non-IV sedation?	Yes	No
Children in ASA I	○1	○2
Children in ASA II	○1	○2
Children in ASA III	○1	○2

32) Which of the following evaluations are used when discharging a pediatric patient after sedation? (Select all that apply)

○1 Ability to walk
○2 Ability to talk
○3 Ability to stay awake for 20 minutes in a quiet room
○4 Ability to void
○5 Ability to drink
○6 Other:

33) Does your institution use a written discharge protocol?
○1 Yes
○2 No

34) Does your institution use a quality assurance protocol for adverse related sedation events?

○1 Yes
○2 No

35) Is your clinic facility equipped with a separate recovery area?
○1 Yes
○2 No

36) Are the following methods used to transfer patients to their vehicle after a sedation appointment?	Yes	No
Stroller	○1	○2
Wheelchair	○1	○2
Carried by a parent	○1	○2
Walking with parent with assistance	○1	○2
Walking with parent without assistance	○1	○2

37) Which **one** of the following factors has **most** influenced the change in the number of sedations at your program since 2011? (Select one response)

○1 Patient cooperation
○2 Parental pressures
○3 Faculty experience
○4 Increased CODA requirements
○5 State sedation guidelines
○6 Insurance fees
○7 Decrease/ Increase operating room availability
○8 Fear of litigation
○9 Other

38) Circle the most appropriate:
○1 Our program has fewer sedations per resident than the number required by CODA
○2 Our program has more sedations per resident than the number required

How strongly do you agree or disagree with each of the following statements?					
		1	2	3	4
		Strongly disagree	Disagree	Agree	Strongly Agree
Q40	The current CODA requirements will directly increase residents' skill and knowledge of sedation				
Q41	Current state dental board regulation of pediatric dentists sedation practices is sufficient to protect the public welfare				

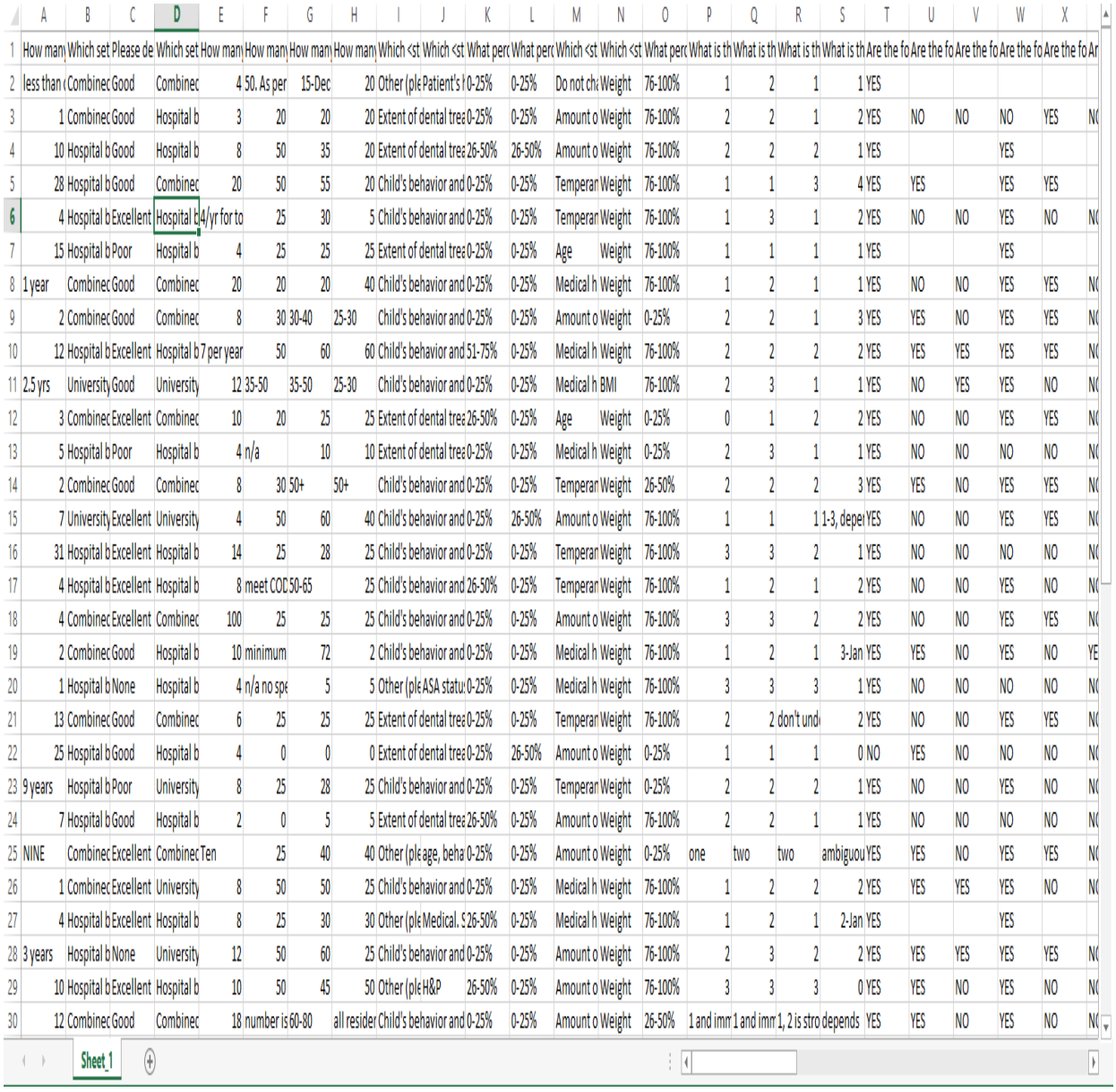
42) What in your opinion, is the **major** factor responsible for not providing pediatric dentistry residents with the CODA required number of non-IV sedation cases or encounters?

○1 Increased cost of professional liability insurance
○2 Improved ability to manage the difficult child without sedation
○3 Parental preference
○4 Fear of litigation
○5 Lack of knowledgeable and skilled faculty in sedation
○6 Not having the proper facilities equipped for the administration of sedation due to low funding
○7 Lack of patient pool

Please submit the survey by hitting the submit button on the right
Thank you very much!

Appendix B. Raw Data

Total raw data was not included in this text due to the large volume of data obtained in this study (more than 52 responses were obtained for all 40 questions included in this survey). A screenshot of some raw data is shown below as an example of the data obtained.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	How many	Which set	Please de	Which set	How many	How many	How many	How many	Which <st	Which <st	What perc	What perc	Which <st	Which <st	What perc	What is th	What is th	What is th	What is th	Are the fo	Are the fo	Are the fo	Are the fo	Are the fo
2	less than	Combinec	Good	Combinec	4	50. As per	15-Dec	20	Other (ple	Patient's	0-25%	0-25%	Do not ch	Weight	76-100%	1	2	1	1	YES				
3	1	Combinec	Good	Hospital b	3	20	20	20	Extent of dental trea		0-25%	0-25%	Amount o	Weight	76-100%	2	2	1	2	YES	NO	NO	NO	YES
4	10	Hospital b	Good	Hospital b	8	50	35	20	Extent of dental trea		26-50%	26-50%	Amount o	Weight	76-100%	2	2	2	1	YES			YES	
5	28	Hospital b	Good	Combinec	20	50	55	20	Child's behavior and		0-25%	0-25%	Temperan	Weight	76-100%	1	1	3	4	YES	YES		YES	YES
6	4	Hospital b	Excellent	Hospital b	4/yr for to	25	30	5	Child's behavior and		0-25%	0-25%	Temperan	Weight	76-100%	1	3	1	2	YES	NO	NO	YES	NO
7	15	Hospital b	Poor	Hospital b	4	25	25	25	Extent of dental trea		0-25%	0-25%	Age	Weight	76-100%	1	1	1	1	YES			YES	
8	1 year	Combinec	Good	Combinec	20	20	20	40	Child's behavior and		0-25%	0-25%	Medical h	Weight	76-100%	1	2	1	1	YES	NO	NO	YES	YES
9	2	Combinec	Good	Combinec	8	30	30-40	25-30	Child's behavior and		0-25%	0-25%	Amount o	Weight	0-25%	2	2	1	3	YES	YES	NO	YES	YES
10	12	Hospital b	Excellent	Hospital b	7 per year	50	60	60	Child's behavior and		51-75%	0-25%	Medical h	Weight	76-100%	2	2	2	2	YES	YES	YES	YES	YES
11	2.5 yrs	University	Good	University	12	35-50	35-50	25-30	Child's behavior and		0-25%	0-25%	Medical h	BMI	76-100%	2	3	1	1	YES	NO	YES	YES	NO
12	3	Combinec	Excellent	Combinec	10	20	25	25	Extent of dental trea		26-50%	0-25%	Age	Weight	0-25%	0	1	2	2	YES	NO	NO	YES	YES
13	5	Hospital b	Poor	Hospital b	4	n/a	10	10	Extent of dental trea		0-25%	0-25%	Medical h	Weight	0-25%	2	3	1	1	YES	NO	NO	NO	NO
14	2	Combinec	Good	Combinec	8	30	50+	50+	Child's behavior and		0-25%	0-25%	Temperan	Weight	26-50%	2	2	2	3	YES	YES	NO	YES	YES
15	7	University	Excellent	University	4	50	60	40	Child's behavior and		0-25%	26-50%	Amount o	Weight	76-100%	1	1	1	1-3, deper	YES	NO	NO	YES	YES
16	31	Hospital b	Excellent	Hospital b	14	25	28	25	Child's behavior and		0-25%	0-25%	Temperan	Weight	76-100%	3	3	2	1	YES	NO	NO	NO	NO
17	4	Hospital b	Excellent	Hospital b	8	meet COD	50-65	25	Child's behavior and		26-50%	0-25%	Temperan	Weight	76-100%	1	2	1	2	YES	NO	NO	YES	NO
18	4	Combinec	Excellent	Combinec	100	25	25	25	Child's behavior and		0-25%	0-25%	Amount o	Weight	76-100%	3	3	2	2	YES	NO	NO	YES	YES
19	2	Combinec	Good	Hospital b	10	minimum	72	2	Child's behavior and		0-25%	0-25%	Medical h	Weight	76-100%	1	2	1	3-Jan	YES	YES	NO	YES	NO
20	1	Hospital b	None	Hospital b	4	n/a no spe	5	5	Other (ple	ASA statu	0-25%	0-25%	Medical h	Weight	76-100%	3	3	3	1	YES	NO	NO	NO	NO
21	13	Combinec	Good	Combinec	6	25	25	25	Extent of dental trea		0-25%	0-25%	Temperan	Weight	76-100%	2	2	don't und	2	YES	NO	NO	YES	YES
22	25	Hospital b	Good	Hospital b	4	0	0	0	Extent of dental trea		0-25%	26-50%	Amount o	Weight	0-25%	1	1	1	0	NO	YES	NO	NO	NO
23	9 years	Hospital b	Poor	University	8	25	28	25	Child's behavior and		0-25%	0-25%	Temperan	Weight	0-25%	2	2	2	1	YES	NO	NO	YES	NO
24	7	Hospital b	Good	Hospital b	2	0	5	5	Extent of dental trea		26-50%	0-25%	Amount o	Weight	76-100%	2	2	1	1	YES	NO	NO	NO	NO
25	NINE	Combinec	Excellent	Combinec	Ten	25	40	40	Other (ple	age, beha	0-25%	0-25%	Amount o	Weight	0-25%	one	two	two	ambiguou	YES	YES	NO	YES	YES
26	1	Combinec	Excellent	University	8	50	50	25	Child's behavior and		0-25%	0-25%	Medical h	Weight	76-100%	1	2	2	2	YES	YES	YES	YES	NO
27	4	Hospital b	Excellent	Hospital b	8	25	30	30	Other (ple	Medical. S	26-50%	0-25%	Medical h	Weight	76-100%	1	2	1	2-Jan	YES			YES	
28	3 years	Hospital b	None	University	12	50	60	25	Child's behavior and		0-25%	0-25%	Amount o	Weight	76-100%	2	3	2	2	YES	YES	YES	YES	YES
29	10	Hospital b	Excellent	Hospital b	10	50	45	50	Other (ple	H&P	26-50%	0-25%	Amount o	Weight	76-100%	3	3	3	0	YES	YES	NO	YES	NO
30	12	Combinec	Good	Combinec	18	number is	60-80	all reside	Child's behavior and		0-25%	0-25%	Amount o	Weight	26-50%	1 and imm	1 and imm	1, 2 is stro	depends	YES	YES	NO	YES	NO

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