Scientific Article

# Use of Restraint and Management Style as Parameters for Defining Sedation Success: A Survey of Pediatric Dentists

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**Abstract:** ***Purpose:*** *The purpose of this study was to identify factors that may influence current American Academy of Pediatric Dentistry (AAPD) members' definitions of a successful oral sedation.* ***Methods:*** *Surveys were electronically mailed to all AAPD members with registered e-mail addresses, and printed surveys were sent via postal mail to all other members. The survey included: (1) items on demographic variables; and (2) questions on sedation methods and definition of success.* ***Results:*** *The following response rates were recorded: (1) electronic survey=26%; (2) printed=45%; and (3) diplomate=53%. The majority of members (55%) characterized their patient management style as being authoritarian. Sixty-seven percent agreed that the need to employ restraints when using sedation does not necessarily indicate that sedation is inadequate or unacceptable. When asked if such a sedation outcome could be defined as being successful, however, the agreement dropped to 47%. When defined as optimal, the respondents' agreement was further reduced to 36%.* ***Conclusions:*** *The practitioner's management style and use of restraint significantly influence how a dentist defines a successful sedation. (Pediatr Dent 2007;29:220-7)*

KEYWORDS: CONSCIOUS SEDATION, PEDIATRIC DENTISTRY, RESTRAINT

Views of what constitutes a successful sedation differ extremely between clinicians. To date, literature has not been offered which clarifies or defines what constitutes success when sedative techniques are chosen to manage severely apprehensive and challenging child dental patients. With few exceptions, research methods have been employed which incorporate: (1) confounding drug comparisons; (2) poorly defined patient selection criteria; and (3) ambiguous definitions of success.[1] There are no clear distinctions to be found in the existing literature which identify when a particular regimen demonstrates efficacy.

Many tools and scales of measurement to assess pediatric sedation have been used in sedation studies. The behavioral research literature is replete with methods that offer detailed and complex mechanisms in which to assess efficacy and success of a given intervention. Such composite indices have included various: (1) self-report measures; (2) behavioral observation ratings; and (3) physiologic parameters.[2,3] The scales developed in the medical literature emphasize the safety and sedation level of the child undergoing medical procedures with little reference to the child's behavior.[4,5]

Scales used in studies dealing with pediatric dental sedation have additional components that measure: (1) safety of the sedation; and (2) the child's movement; (3) crying; and (4) physical resistance. Among those found in the dental literature are the: (1) Houpt scale[6]; (2) Venham scale[7]; (3) Ohio State University Behavior Rating Scale[8]; (4) Ramsay Sedation Score[9]; (5) North Carolina Behavior Rating Scale[10]; and (6) others, including modified versions of these scales.

The Houpt scale was found to be used most frequently among studies that were scientifically qualified to be included in the Cochrane review and which met the strict inclusion criteria of that study. Twenty-six different types of measurement scales were used among the 53 studies; 47% utilized the Houpt scale or a modification of it in their study. The Houpt scale measures: (1) sleep; (2) movement; (3) crying; and (4) overall behavior. This scale, however, may consider a sedation in which a papoose board was used throughout treatment as successful. Indeed, in the review of 53 studies, 49% used papoose boards. In contrast, a tool was devised emphasizing the importance of the lack of physical resistance of the sedated child during treatment.

Assessment of efficacy and sedation success was defined and developed by Nathan[11-13] based on the patient's movements and consequent need to be restrained. Under optimal circumstances, efficacy and success of a sedation regimen

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was implied by the ability to render quality care under circumstances that offer minimal or no interfering movement.

Ideal or excellent sedation was defined where treatment was permitted without need for restraint (absence of persistent interfering movement), and where the patient remained responsive to verbal stimulation before, during, and following treatment.

Acceptable or adequate sedation was defined where all or most treatment was permitted with minimal need for occasional application of soft restraint for reflexive-type movement with nonintentional interfering movement. It was assumed that need for restraint of a persistent nature reflects an inadequate (albeit not necessarily unsafe) level of sedation.

Pediatricians, anesthesiologists, and pediatric dentists have expressed differing views regarding the administration and safety of conscious sedation (CS).[14-16] Advocates of its use prefer it to its alternative, general anesthesia (GA). Opponents claim it to be an unsafe and unreliable method of patient management. Even among pediatric dentists themselves, there may be little agreement regarding the definition of success in sedating very young, uncooperative children. Is sedation considered successful when all the treatment goals are accomplished, regardless of the patient's behavior? Or is success achieved only when the treatment is completed without the use of any restraint?

This study's purpose was to identify factors that may influence current American Academy of Pediatric Dentistry (AAPD) member's definitions of a successful oral sedation.

## Methods

After approval by the Institutional Review Board of the University of Iowa, Iowa City, Iowa and the AAPD, a letter describing the study and its purpose was electronically mailed to all AAPD members during the fall of 2004. Surveys were filled out anonymously online. Nonresponders were sent follow-up letters electronically 2 weeks after the initial mailing. For those members who did not have e-mail addresses, printed surveys were sent. There was no follow-up mailing for nonresponders of the printed surveys.

Survey questions included: (1) institution/practice location; (2) type of practice and patient population; (3) years of experience; (4) sedation methods; (5) drug regimens; (6) frequency of sedation use; (7) use of restraint; (8) management style; and (9) hypothetical clinical scenarios. The data presented in this paper is limited to the issue of use of restraint and management style in assessment of sedation success. Information regarding sedation style and techniques will be published separately in another paper.

**Statistical analysis.** Survey data were collected in Microsoft Excel (Excel 2003, Microsoft Corporation, Redmond, Wash.) spreadsheets and analyzed using the SAS statistical analysis software. The chi-square test, Cochran-Mantel-Haenszel chi-square test, and Fisher's exact test were conducted to assess the associations between sedation and management style. These included: (1) the use of restraints during sedation and years since graduation; (2) program attended; (3) type of practice; (4) US region; (5) world region; (6) location; and (7) board certification.

## Results

Survey results are presented in Tables 1 through 3.

**Demographics.** *Survey response rate.* Of the 3,657 e-mails sent, 830 were returned as undeliverable for a total of 2,827 successfully sent e-mail messages. Of these, 731 were returned in usable form, resulting in a 26% electronic response rate (Table 1). Furthermore, of the 2,827 e-mail addresses, 933 were for board certified pediatric dentists (33%). Of these 933, 497 diplomates responded to the survey's electronic version for a diplomate response rate of 53%. A total of 480 printed surveys were mailed, of which 215 were returned and included in the survey analysis for a printed response rate of 45% (Table 1).

**Years in practice, location of practice, and training received.** Forty-four percent of survey respondents indicated that they were in practice for over 20 years, and 31% of the respondents were in practice for less than 10 years. Forty-four percent were graduates of a combined hospital/university program, 26% were from a university program, and 30% were from a hospital program. Seventy-three percent consisted of full-time practitioners who had a practice located in an urban area. Only 14% of practitioners responded that they have a practice in a rural area (Table 1).

Different sections of the country were well represented. Thirty-one percent resided in the South. The West, East, and Midwest were all equally distributed—with approximately 20% for each region.

Of the 97 foreign respondents, 35% were from Canada. Central/South America, Europe, Asia, and Africa were equally distributed—with approximately 15% each. Australia/New Zealand had the lowest representation (4%; Table 1).

**Board certification status.** Sixty-eight percent of respondents were board certified, and 32% were not.

**Ages of patients seen by respondents.** Eighty-three percent of respondents said that more than 30% of their practice consisted of children less than 6 years of age. Only 9% responded that over 30% of their practice comprised children 12 years of age or older.

**Use of restraint.** Sixteen survey questions examined practitioners' views on sedation, management style, and the use of

Table 1. DEMOGRAPHICS/CHARACTERISTICS OF RESPONDENTS*

| TOTAL NO. OF RESPONDENTS | 946 |
|---|---|
| **Response rates (%)** | |
| Electronic | 26 |
| Printed | 45 |
| Diplomate | 53 |
| **Time since graduation (ys)** | |
| <10 | 31 |
| 10-20 | 25 |
| >20 | 44 |
| **Training type** | |
| Hospital-based | 30 |
| University-based | 26 |
| Combined | 44 |
| **Practice type** | |
| Full-time private practice | 73 |
| Full-time academics | 5 |
| Part-time private practice | 15 |
| Part time academics | 2 |
| Military | 1 |
| Retired | 0.1 |
| Other | 3.9 |
| **Practice area (United States)** | |
| East | 22 |
| West | 22 |
| Midwest | 21 |
| South | 34 |
| **Practice area (worldwide)** | |
| United States | 90 |
| Canada | 4 |
| Europe | 1 |
| Africa | 1 |
| Asia | 1 |
| South/Central America | 2 |
| Australia/New Zealand | 1 |
| **Practice location** | |
| Urban | 84 |
| Rural | 16 |
| **Board certification status** | |
| Yes | 68 |
| No | 32 |

* Figures shown as percentage of respondents.

restraints during sedation.

Although 56% of respondents said that they preferred not to use any restraint (question no. 3; Table 2), 29% stated that they always use restraint with oral sedation and only 33% said they never or hardly ever did (question no. 1; Table 2).

When asked what type of restraint was preferred, 45% relied on parents to restrict movement (active restraint) and 42% preferred an immobilization device (passive restraint; question no. 4; Table 2). Seventy-nine percent included the parents in the decision to restrain a patient (question no. 14; Table 2).

When using conscious sedation, only 29% of respondents said that they preferred to rely on sedative agents to overcome patient movement (question no. 5; Table 2).

**Definition of success related to use of restraint.** Five of the questions specifically addressed the respondent's definition of sedation success (questions no. 6-10; Table 2).

A majority (67%) agreed that the need to employ restraints when using sedation did not necessarily indicate that the sedation was inadequate or unacceptable (question no. 10; Table 2). When asked if such a sedation outcome could be defined as being successful, however, the agreement dropped to 47% (question no. 7; Table 2). When defined as optimal the respondents' agreement was further reduced to 36% (question no. 8; Table 2).

**Management style.** Fifty-five percent of respondents characterized themselves as having an authoritarian or disciplinarian management style, and 24% described themselves as child advocate/permissive. Twenty-one percent was neutral.

**Associations found in the survey using bivariate analysis.** Examined were associations between: (1) management style; (2) use of restraint; (3) years since graduation; (4) program attended; (5) type of practice; (6) US region; (7) world region; (8) location; and (9) board certification. A summary of all significant associations is presented in Table 3.

**Years since graduation.** Based on the Cochran-Mantel-Haenszel chi-square test, statistically significant associations were found between years since graduation and the use of restraints/immobilization and management style. Dentists who had more than 10 years of experience were more likely to use a restraint device and nitrous oxide during oral sedation ($P<.001$) and consider themselves disciplinarians in their management style ($P=.023$; Table 3).

**Program attended.** The only statistically significant

## Table 2. SURVEY QUESTIONNAIRE REGARDING SUCCESS OF SEDATION AND USE OF RESTRAINT*

| DESCRIPTION | STRONGLY OR GENERALLY AGREE | NEUTRAL FEELINGS | STRONGLY OR GENERALLY DISAGREE | NOT APPLICABLE |
|---|---|---|---|---|
| 1. I always use a restraint device when I use oral sedation. | 29 | 8 | 33 | 30 |
| 2. I always use nitrous oxide and a restraint device when I use oral sedation. | 21 | 10 | 36 | 32 |
| 3. I prefer not to use restraint | 56 | 12 | 27 | 5 |
| 4. If need exists to restrain patient movement, I prefer parent(s) to assist rather than use an immobilization device | 45 | 11 | 42 | 3 |
| 5. I prefer to rely on sedative or unconscious techniques to overcome patient movement or resistance | 29 | 16 | 47 | 8 |
| 6. The need for persistent application of restraint indicates an inadequate level of sedation for a given patient | 37 | 16 | 35 | 12 |
| 7. I would define sedation as "successful" if treatment objectives are accomplished and general anesthesia is avoided (despite a need for persistent use of restraint). | 47 | 14 | 28 | 10 |
| 8. I would define sedation as being "optimal" if treatment can be accomplished without need for physical restraint. | 36 | 14 | 39 | 23 |
| 9. I would define sedation as "acceptable" if treatment objectives are accomplished (and general anesthesia is avoided) where persis tent use of restraint is needed | 49 | 18 | 22 | 11 |
| 10. The need to employ restraints when using sedation does not necessarily indicate that sedation is inadequate or unacceptable. | 67 | 11 | 11 | 10 |
| 11. I would prefer to restrain a 3- or 4-year-old patient for limited treatment needs than use a sedative technique. | 36 | 12 | 47 | 4 |
| 12. I would prefer to restrain a 3- or 4-year-old patient coupled with conscious sedation than use general anesthesia. | 35 | 14 | 44 | 7 |
| 13. The decision to restrain a patient is made exclusively by me. | 24 | 12 | 59 | 6 |
| 14. The decision to restrain a patient is made mutually by me and the parent(s). | 79 | 7 | 9 | 4 |
| 15. I would characterize my style as authorita- rian (high expectations for child cooperation, discipline). | 55 | 19 | 37 | 4 |
| 16. I would characterize my style as child ad vocate (generally low expectation for child cooperation). | 24 | 21 | 52 | 1 |

* Figures shown as percentage of respondents.

finding was that those who attended combined programs were more likely to define themselves as a child advocate ($P$=.032) and less likely to define themselves as authoritarian or disciplinarian ($P$=.006; Table 3).

**Full-time practice vs full-time academic.** Respondents who worked in full-time private practice were more likely to prefer not to use restraint ($P$=.038). If need existed to restrain a patient, they preferred parental restraint of the patient rather than use of a restraining device. Full-time academicians were more likely to agree that the need to employ restraints during sedation does not indicate that the sedation is inadequate or unacceptable ($P$=.045; Table 3).

**US regions.** Results revealed there were significant associations between US region and the use of restraints/immobilization ($P$=.036). The results indicated that those who lived in the Northeast were more likely to prefer treatment without restraint. Those who lived in the Midwest and South were more likely to define sedation as "successful" if treatment objectives were accomplished and GA was avoided (despite a need for persistent use of restraint).

**United States vs foreign countries.** US dentists were more likely to always use restraint when using oral sedation. Foreign dentists, however, preferred no restraints and, if necessary, preferred using parents to restrain a child than a restraining device and defined sedation as inadequate if there is a need for persistent restraint ($P$=.021). US dentists were more likely to define themselves as being authoritarian, while the dentists in the foreign countries were more likely to define themselves as being a child advocate.

**Rural vs urban.** No significant associations between location and the use of restraints/immobilization were found. Dentists from rural areas, however, were more likely to define themselves as a disciplinarian ($P$=.039; Table 3).

## Discussion

This survey of AAPD members was conducted to provide a basis for the definition of a successful conscious sedation of a child undergoing dental treatment as perceived by Academy members. A clarification of the term "conscious sedation or sedation" as used in the survey is warranted. Previously, the treatment of a child with oral premedication with or without nitrous oxide inhalation analgesia was termed conscious

**Table 3.** SUMMARY OF ASSOCIATIONS AS DETERMINED BY BIVARIATE ANALYSIS ON THE USE OF RESTRAINTS/IMMOBILIZATION OR INDIVIDUAL MANAGEMENT STYLE AND PHILOSOPHY, BY YEARS SINCE GRADUATION, PROGRAM ATTENDED, TYPE OF PRACTICE, US REGION, WORLD REGION, LOCATION, BOARD CERTIFICATION (N=946)

| DESCRIPTION NUMBERS REFER TO TABLE 2 SEQUENCE | YEARS SINCE GRADUATION | PROGRAM ATTENDED | PRACTICE VS ACADEMIC | US REGION | WORLD REGION | LOCATION (RURAL VS URBAN) | US REGION |
|---|---|---|---|---|---|---|---|
| 1. I always use a restraint device when I use oral sedation. | <.001 | .667 | .667 | .069 | 012 | .644 | .958 |
| 2. I always use nitrous oxide and a restraint device when I use oral sedation. | <.001 | .159 | .064 | .185 | .038 | .903 | .750 |
| 3. I prefer not to use restraint. | .004 | .325 | .038 | .002 | .037 | .601 | .145 |
| 13. The decision to restrain a patient is made exclusively by me. | .006 | .051 | .016 | .946 | .906 | .921 | .653 |
| 14. The decision to restrain a patient is made mutually by me and the parent(s). | .044 | .598 | .653 | .989 | .180 | .137 | .299 |
| 15. I would characterize my style as authoritarian. | .073 | .006 | .936 | .235 | .0055 | .034 | .947 |
| 16. I would characterize my style as child advocate. | .023 | .032 | .806 | .629 | .021 | .252 | .635 |

sedation. This term was changed. The current AAPD guidelines[17] define such procedures as being "minimal sedation," with its definition being:

> *"Minimal sedation (old terminology "anxiolysis"): a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected".*

The second level of sedation is termed "moderate sedation," with its definition being:

> *"Moderate sedation (old terminology "conscious sedation" or "sedation/analgesia"): a drug-induced depression of consciousness during which patients respond purposefully to verbal commands (eg, "open your eyes,") either alone or accompanied by light tactile stimulation (a light tap on the shoulder or face, not a sternal rub). For older patients, this level of sedation implies an interactive state; for younger patients, age-appropriate behaviors (eg, crying) occur and are expected...."*

This level may be accompanied by increased risks, because the patient who receives moderate sedation may progress into a state of deep sedation and obtundation. The practitioner must be prepared to increase the level of vigilance corresponding to what is necessary for deep sedation. The present paper relates to minimal sedation, although the term used throughout the paper is either "conscious sedation" or "sedation."

This study's purpose was to determine how pediatric dentists define a successful sedation based primarily on the dentist's management style and use of restraint. For example, a practitioner who views him or herself as authoritarian/disciplinarian may consider sedation successful if treatment objectives are completed—regardless of child behavior and need for restraint. Conversely, a dentist who is a child advocate and who never uses any forms of restraint would most likely define the former outcome as being unacceptable and would opt for deeper sedation or perhaps prefer GA. The findings of this paper support this analysis.

The survey results indicated that many differences of opinion exist between members and—in many instances members are evenly divided into 2 opposing groups. There are issues, however, in which a clear majority was found. The majority of members characterized their patient management style as being authoritarian (55%). By definition, characteristics of an authoritarian management style include: (1) higher expectations for cooperation; and (2) more willingness to serve as a disciplinarian. Dentists who have a child-advocate management style:

1. have low expectations for cooperation;
2. are unwilling to serve as a disciplinarian; and
3. prefer that role to be deferred to the parent(s).

A significant association was found between age and style. Younger members view themselves more as child advocates, and a shift will most likely occur as older members retire.

Sixty-seven percent of the members stated that the need to employ restraints when using sedation does not necessarily indicate that sedation is inadequate or unacceptable. Houpt[18] reported that approximately 75% of practitioners who use sedation included some form of physical restraint during the sedation procedure. A more recent survey[19] reported a lower number of dentists using some form of restraint during sedation (56%), with 85% of the respondents predicting that no change will be made in their use in the near future. Only 29% of the dentists in the present study stated that they always use restraint when using oral sedation. This finding may be indicative of parental unacceptability of the use of restraint for dental procedures.[20]

In an attempt to rank sedation success by use of restraint, this survey found that 36% of respondents defined a sedation as optimal if treatment was accomplished with no restraint. Furthermore, 39% felt that the use of persistent restraint rendered the sedation unacceptable. A total of 67%, however, felt that the need to employ restraint with sedation did not necessarily indicate that the sedation was inadequate or unacceptable. Such a high percentage may reflect practitioner reluctance on increasing dosages of conscious sedation drugs to minimize movement and accept restraint as a compromise to adequate patient care. Indeed, in data that will be presented more fully in a subsequent publication, only 29% of respondents preferred to rely on the sedative to overcome patient movement (question no. 5; Table 2).

This survey's results suggest that the most relevant factor in defining a successful sedation is whether the use of restraint is allowed during the treatment session. Houpt[18] suggested that it is likely that practitioners reflect the particular bias that was developed during their training in regard to the use of sedation. It appears likely that whether or not a sedative agent is used in combination with restraint depends more on the experiences of the practitioner than on the type of child patient.

A recent study[21] on behavior management teaching in advanced pediatric dentistry training programs showed that 98% of the programs taught that the use of passive immobilization (restraint with the use of a restraining device such as a Pediwrap or Papoose board) was acceptable for use on the sedated child. The exclusion of any form of restraining device, however, has become mainstream practice and the standard of care in Europe. For example, restraining devices (such as the Papoose board) are not acceptable in UK dental practices[22,23] under any circumstances.

In the current survey, foreign dentists (unlike their US colleagues) defined sedation as inadequate if there is a need

for persistent restraint. It can be assumed that this is due to their view on restraint. Minimal or even moderate sedation—as defined by the AAPD and during which children may be expected to cry and display resistant movements—may not be acceptable in certain societies and cultures. The resultant situation is that children are seldom sedated in the United Kingdom or other European countries, but rather are referred for treatment under GA. In many instances individual children may undergo multiple GAs for dental treatment.[24]

This study's limitations are those intrinsic to all multiple-choice surveys. The questions and statements in this study were, in many instances, presented twice in different formulations. This was intended to minimize bias attributed to either a positive or negative wording of the question. Although the number of respondents was high, many practitioners chose not to take a stand on many sensitive issues and remained neutral. On some issues, as many as 20% of the respondents marked their positions as neutral. Another weakness of this study is that a disproportionate number of diplomates participated in the study compared with noncertified members. The results may, therefore, not reflect the opinions of noncertified members.

This survey was one of the first to be electronically delivered to AAPD members. A concern of the authors was whether respondents would be reflective of all sectors of the membership—including perhaps specific age groups of members who were not computer proficient. As a result of this concern, printed surveys were mailed to those members who did not have a listed e-mail address.

The demographics of this electronic survey are similar to other recent AAPD surveys,[18,19] excluding the percentage of participating diplomats—which was higher in this survey. Since the introduction of computers, there has been an evolution of improvements in data collection methods corresponding to advances in technology.[25] Web-based data collection instruments have proven to be very efficient and effective data collection systems. For this survey, this method expedited data processing and analysis and eliminated most of the need for: (1) cumbersome and expensive mailing; (2) transfer and tracking of forms; (3) data entry; and (4) verification.

Several medical studies[26-29] have been published comparing Internet vs mailed surveys. These studies found that there were fewer incomplete questions by participants who completed e-mail surveys compared with postal or fax participants. The opposite was found in the present study. The mailing response rate was more than double the online rate. This may be attributed to the length of the overall survey, which included over 64 questions—some of which were open-ended. Respondents would be unable in most instances to complete the survey away from their office or home, whereas the mailed copy would be more convenient to fill out at ease. Before e-mail surveys can become a standard survey tool, there may need to be ongoing evaluations that critically evaluate providers' responses to e-mail surveys compared with other survey modes. In the meantime, it is suggested that mixed-mode surveys be used. Clearly in the near future, however, postal mailing of surveys will become obsolete and guidelines for proper structure of such research will be needed.

## Conclusions

It can be concluded from this study that, for the population surveyed, the current trends in defining a successful sedation of a child undergoing dental treatment include the following:

1. The majority of pediatric dentists agree that the need to employ restraint with sedation does not necessarily indicate that sedation is inadequate or unacceptable.
2. The practitioner's management style appears to have a significant role in how one makes use of sedation and defines success.

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