Original Article

Barriers to Using Advanced and Pharmacological Behavior Management Techniques: A Survey of Pediatric Dentists in Jeddah, Saudi Arabia

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ABSTRACT

Aim: In this study, we assessed the use of advanced pharmacological behavior management techniques (BMTs) among pediatric dentists in Saudi Arabia and the barriers to their clinical application. **Materials and Methods:** This cross-sectional study used a self-administered electronic survey that targeted members of the Saudi Society of Pediatric Dentistry. The questionnaire included questions on five techniques of advanced and pharmacological behavior management recommended by the American Academy of Pediatric Dentistry. Descriptive statistics, frequency, Chi-square test, and Fisher's exact test were used to present the outcomes and independent variables. **Results:** A total of 57 pediatric dentists completed the survey. Nitrous oxide (N_2O) sedation, general anesthesia (GA), and protective stabilization were used regularly by pediatric dentists in 70.2%, 68.4%, and 56.1% of the participants, respectively. A few participants reported using oral (14.0%) or intravenous (IV) sedation (10.5%) regularly. The most common barriers to using these techniques were either dentists' discomfort or the non-availability of the equipment/drugs. **Conclusions:** The most common method used by pediatric dentists was N_2O inhalation sedation, followed by GA and protective stabilization. The participants' use of pharmacological BMTs, including IV and oral sedation, was relatively low.

Keywords: *General anesthesia, nitrous oxide, protective stabilization*

Introduction

Pediatric dentists employ a range of behavior management techniques (BMTs) to manage the behavior of pediatric patients and guarantee successful dental care.[1] The basic BMTs are non-pharmacological, such as tell-show-do, non-verbal communication, voice control, positive reinforcement, parental presence or absence, and distraction, in addition to nitrous oxide (N_2O)/oxygen sedation, which is a pharmacological technique.[2] Additionally, a range of pharmacological behavior management strategies such as relative analgesia and general anesthesia (GA) are available to be used with non-cooperative pediatric children.[3] Most children can be effectively managed using the strategies outlined in the basic behavior guidelines.[4] In addition to protective stabilization, pharmacological methods for advanced behavior management include oral sedation, intravenous (IV) sedation, and GA.[1] Pediatric dentists tailor their behavior guidance strategies to meet the specific needs of each pediatric patient they treat.[5,6]

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Dental caries have been commonly reported among Saudi children, with prevalence higher than 80%.[7] Several children with dental caries visit the dentist only when they are experiencing a severe toothache or a dental abscess.[8] Owing to a lack of psychological or emotional maturity and/or mental, physical, or medical disabilities, these children do not always cooperate during dental treatment. The percentage of children in Saudi Arabia experiencing dental anxiety and fear reportedly ranges from 12% to 24%.[9] Owing to the great demand for the treatment of these children and the high rate of dental fear and anxiety among them, these children are frequently referred to pediatric dentists trained in advanced BMTs.

Multiple factors influence the selection of an appropriate behavior counseling approach and its utilization among practicing pediatric dentists in North America, including advanced education training, residency type, graduation decade, and practice type.[2] In addition, personal preferences are known to impact dentists' choice and use of behavior management approaches.[10] Little information is available on the barriers to using advanced and pharmacological BMTs among pediatric dentists in Saudi Arabia. Thus, studies are warranted to study the frequency of use and barriers to using advanced pharmacological behavior guidance techniques among pediatric dentists in Jeddah, Saudi Arabia. In the present study, we assessed the barriers to the use of advanced and pharmacological behavior guidance techniques among pediatric dentists in Saudi Arabia.

Materials and Methods

Setting and design

This descriptive cross-sectional study was conducted in Jeddah between October, 2020 and November 2020. The questionnaire was given to participants on a computer tablet to be completed independently in the hospital setting. The study incorporated a non-purposive snowball sample.

Inclusion criteria

The data for this cross-sectional study were obtained using a self-administered electronic survey targeting members of the Saudi Society of Pediatric Dentistry (SSPD) who were currently practicing pediatric dentistry in five preselected governmental and private dental clinic hospitals in Jeddah. Attendees of the SSPD conference were asked to complete the survey on the day of the conference. Pediatric dentistry postgraduate residents and dental interns were excluded from the analysis.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and was approved by the Research Ethics Committee of the Faculty of Dentistry of King Abdulaziz University, Jeddah, Saudi Arabia (approval no: 099-10-18). The date of approval of ethics was October 2018. All participants provided written consent before taking part in the study.

Sample size calculation

The sample size was calculated based on the statistics reported by the dentists in different areas across Saudi Arabia, as described previously.[11] The minimum sample size was 37, and the maximum was 57 registered pediatric dentists in Jeddah.

Study instrument

The questionnaire used in this study was valid and reliable based on our previous study.[10] The survey consisted of four sections. In the first section, after consenting to participate in the research, participants were asked about their demographics such as age, gender, level of education, year of graduation, and work experience. The second section included questions such as how often participants used the five advanced and pharmacological BMTs recommended by the American Academy of Pediatric Dentistry. These techniques include GA, IV sedation, oral sedation, N_2O sedation, and protective stabilization. To gauge how often dentists employed different techniques, we used a 5-point Likert scale, including always, often, sometimes, rarely, and never. In the third part of the survey, participants were asked about the effectiveness of each of the five BMTs in their day-to-day work. The fourth section sought to identify obstacles faced by dentists in using the five BMTs.

The obstacles included dentist-related factors or external factors. Factors specifically related to dentists were limited education and training ("I am not familiar with the technique" or "I am not trained") and individual preferences and comfort ("I am not comfortable with the technique," "I do not have enough experience," "I am concerned about potential complications," or "I had a complication/emergency and never used it again"). External factors included barriers related to the availability (such as lack of trained personnel or equipment) and other factors ("I am not licensed" or other reasons). It was mandatory to answer all questions, which eliminated the problem of missing data. Before the actual study began, the questionnaire was pilot tested on two pediatric

Table 1: Participants demographics, credentials, and clinical experience with pediatric patients

Demographics, credentials, and clinical experience		Pediatric dentists *n* = 57 (%)
Age	<35 years	34 (59.6)
	≥35 years	23 (40.4)
Gender	Female	43 (75.4)
	Male	14 (24.6)
Highest degree in dentistry	Bachelor's	20 (35.1)
	Master's	19 (33.3)
	PhD	18 (31.6)
Postgraduate education	North America	8 (14.0)
	Middle east	32 (56.1)
	Australia or Europe	9 (15.8)
Board certified in pediatric dentistry	Yes	21 (36.8)
	No	36 (63.2)
Position	Consultant	21 (36.8)
	Specialist	12 (21.1)
	Resident	23 (40.4)
Institution	Ministry of Health	20 (35.1)
	Military	5 (8.8)
	Academia/University	29 (50.9)
	Private practice	3 (5.3)
Years of practice	≤5 years	18 (31.6)
	>5 years	39 (68.4)
Patient age distribution	1–5 years	18 (31.6)
	6–10 years	37 (64.9)
	11–15 years	1 (1.8)
	16–20 years	1 (1.)

dentists and four postgraduate students to assess its readability and determine whether it required any modifications.

Statistical analysis

All participants' response data were safely stored with the primary investigator in a password-protected document. Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 22.0 (SPSS Inc., Chicago, Illinois). Descriptive statistics, including frequencies and percentages, were calculated. Associations between the demographic characteristics (age, gender, postgraduate education, and years of practice) and the use of advanced behavior methods (N_2O, GA, and protective stabilization) were assessed using the Chi-square test and Fisher's exact test.

Results

A total of 57 pediatric dentists completed the survey. More than half of them (59.6%) were aged <35 years, and 40.4% were ≥35 years. Three-quarters of the participants were females (75.4%). About half (56.1%) had postgraduate training in the Middle East; however, only about one-third (36.8%) were board-certified in pediatric dentistry. Twenty-nine (50.9%) participants worked in the academic field, whereas the remaining worked in other government hospitals or private practices. Approximately two-thirds (68.4%) had >5 years of experience in pediatric dentistry. More than two-thirds (64.9%) reported that the primary age group of patients they attended to was 6 to 10 years old, whereas less than one-third (31.6%) reported that the primary age group they treated regularly was 1 to 5 years old [Table 1]. Table 2 shows the association between the demographic characteristics and the use of advanced behavior methods. Postgraduate education was significantly influenced the use of advanced behavior methods as general dentists were significantly less likely to use N_2O, GA, and protective stabilization ($P = 0.000$).

Figure 1 shows the reported regular use of advanced behavior management by the participating pediatric dentists. N_2O sedation, GA, and protective stabilization were used regularly by 70.2%, 68.4%, and 56.1% of the participants, respectively. Only a small number of participants reported regular use of oral (14.0%) and IV sedation (10.5%).

Figure 2 illustrates the frequency of these techniques' usage among pediatric dentists. GA was reported to be used by 7.0% of the participants and often by 21.1%. Almost one-third of the participants (23.8%)

Table 2: The association between the demographic characteristics and the use of advanced behavior methods

Demographics, credentials, and clinical experience		N_2O use frequency (%)		*P*	GA use frequency (%)		*P*	Protective stabilization frequency (%)		*P*
		Yes	No		Yes	No		Yes	No	
Age	<35 years	29 (37.1)	49 (62.8)	0.19	24 (30.7)	54 (69.2)	**0.000**	24 (30.7)	54 (69.2)	**0.05**
	≥35 years	16 (51)	15 (49)		22 (70.9)	9 (29.0)		16 (51)	15 (49)	
Gender	Female	32 (42.6)	43 (57.3)	0.68	30 (40)	45 (60)	0.534	31 (41.3)	44 (58.6)	0.198
	Male	13 (38.2)	21 (61.7)		16 (47.0)	18 (52.9)		9 (26.4)	25 (73.6)	
Postgraduate education	North America	9 (60)	6 (30)	**0.000**	9 (60)	6 (30)	**0.000**	5 (33.3)	10 (66.7)	**0.000**
	Middle east	22 (62.8)	13 (23.3)		22 (62.8)	13 (23.3)		21 (60)	14 (40)	
	Australia or Europe	9 (60)	6 (30)		8 (53.3)	7 (46.6)		7 (46.6)	8 (53.3)	
	No postgraduate education	32 (38.5)	51 (61.4)		29 (34.9)	54 (65.1)		26 (31.3)	57 (68.6)	
Years of practice	≤5 years	16 (37.2)	27 (62.7)	0.55	13 (30)	30 (70)	0.49	14 (32.5)	29 (67.4)	0.54
	>5 years	29 (43.9)	37 (56)		33 (50)	33 (50)		26 (40)	40 (60)	

N_2O = nitrous oxide, GA = general anesthesia

reported never using GA in their current dental setting. Furthermore, 22.8% of the participants never used N_2O in the current dental setting. Protective stabilization was rarely used by 45.6% of participating pediatric dentists. Most respondents reported never using IV (82.5%) or oral sedation (73.7%) in their current dental practice.

Table 3 lists the reasons for excluding these techniques. The most frequently reported reason for not using protective stabilization was "I am not comfortable with the technique." Oral sedation and IV sedation were not used primarily because of the following reasons: "The equipment/drug is not available" and "I was not trained." Almost 22.8% of the pediatric dentists reported that they were uncomfortable using protective stabilization. A high percentage of patients reported not using oral sedation because the equipment was unavailable.

Discussion

Pediatric dentists' choice and use of advanced pharmacological behavior management methods could be influenced by several variables, including professional training, practical experience, and personality traits.[1] According to one report, senior dentists employ a greater variety of BMTs.[6] Postgraduate residents are taught different behavior management curricula depending on the program, which is constantly changing.[12] In addition, pediatric dentists' decisions are influenced by parents' acceptance of different BMTs.[13] However, the barriers addressed in our study provide light on new and previously unknown criteria that limit pediatric dentists' options for using BMTs in Saudi Arabia. They are connected to issues with education and training, comfort and personal choice, the availability of equipment and medications, or other issues. The findings of this study demonstrated that most study participants underutilized oral and IV sedation, either as a result of inadequate training or a lack of equipment.

The majority of the participants had never used IV sedation (82.5%) and oral sedation (73.7%) in their dental practice. These high percentages of nonuse of sedation were attributed to the unavailability of equipment/drugs (45.6% for oral sedation) and lack of training during residency (29.8% for oral sedation and 35.1% for IV sedation), despite adequate training in all other techniques. In North America, pediatric dentists reported substantially lower percentages of underuse of IV (57%) and oral sedation (19%). The availability of resources (47.0%) and educational training (80.0%) has been reported to significantly impact the choice of guidance technique.[2] Globally,

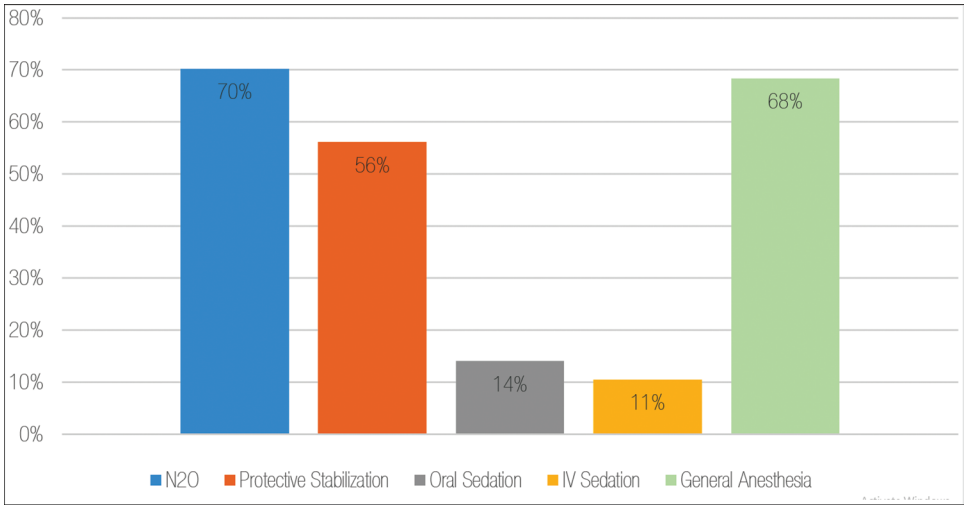
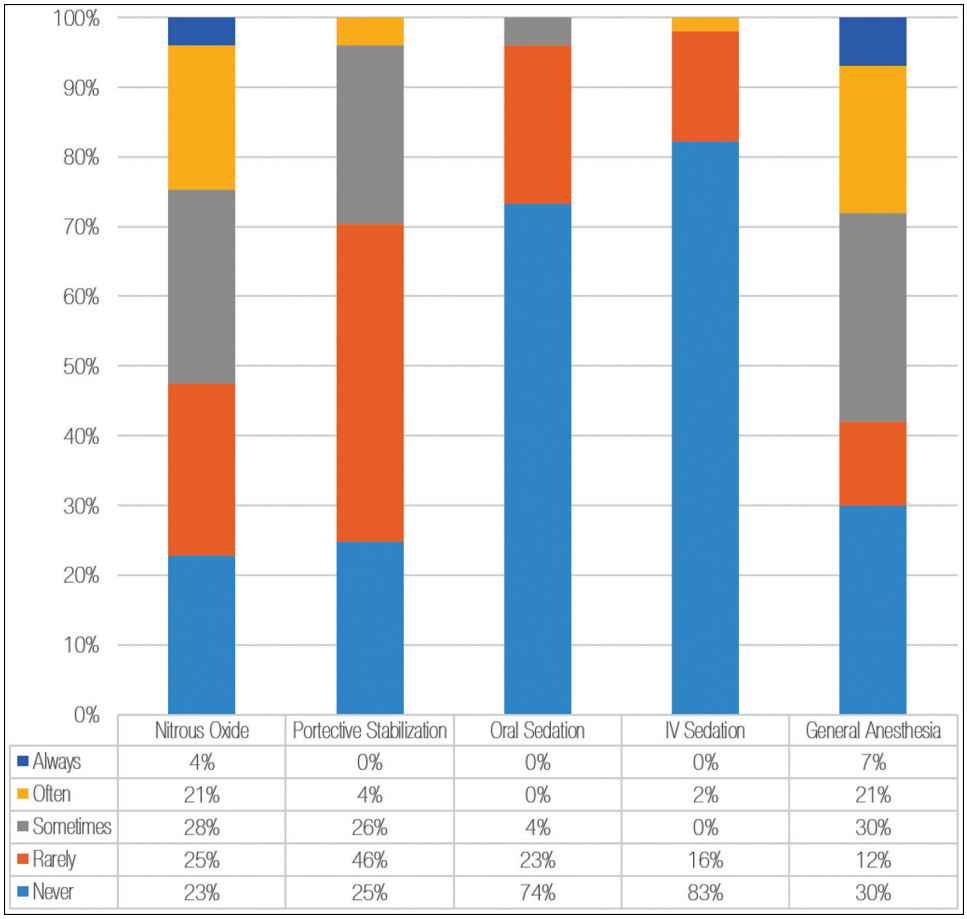


Figure 1: Percentages of using advanced and pharmacological behavior guidance by pediatric dentists



	Nitrous Oxide	Portective Stabilization	Oral Sedation	IV Sedation	General Anesthesia
Always	4%	0%	0%	0%	7%
Often	21%	4%	0%	2%	21%
Sometimes	28%	26%	4%	0%	30%
Rarely	25%	46%	23%	16%	12%
Never	23%	25%	74%	83%	30%

Figure 2: Frequency of using advanced and pharmacological behavior management techniques

only 44% of pediatric dentists reported utilizing oral sedation in their current dental practice, and approximately 60% reported that sedation was covered in the curriculum of dental school.[14] Approximately half of the pediatric dentists in the Arabian region (55.49%) declared that they did not use sedation in their clinical practice.[15] Sedation is a crucial technique to manage anxious and apprehensive patients as well as young children who are unable to cooperate with dentists' instructions.[1] Pediatric dentists can deliver effective and efficient dental care by properly assessing and managing children's behavior. Children's behavior

Table 3: Reported barriers to the use of the advanced and pharmacological BMTs

Barriers to the use of the advanced BMTs		N_2O (%)	Protective stabilization (%)	Oral sedation (%)	IV sedation (%)	GA (%)
Education and training reasons	I am not familiar with the technique	1.8	3.5	7.0	7.0	3.5
	I was not trained	1.8	5.3	29.8	35.1	5.3
Personal preference and comfort	I am not comfortable with the technique	3.5	22.8	3.5	5.3	1.8
	I do not have enough experience	5.3	0	7.0	8.8	3.5
	I am worried about possible complications	1.8	8.8	8.8	8.8	1.8
	I had a complication/emergency and never used it again	0	0	1.8	0	0
Availability	There are no personnel	1.8	0	8.8	14.0	3.5
	The equipment is not available	15.8	3.5	45.6	8.6	8.8
Others	I am not licensed	5.3	0	8.8	14.0	5.3
	Others	1.8	8.8	5.3	1.8	7.0

BMTs = behavior management techniques, N_2O = Nitrous oxide, IV = intravenous, GA = general anesthesia

at subsequent dental appointments can be improved using proper management techniques.[16] Therefore, pediatric dentists must have access to different BMTs to deliver quality dental care.

According to the present study's findings, N_2O sedation was used by most pediatric dentists (70.20%). This suggests that the dentists were knowledgeable and skilled in these procedures. In dental clinics, N_2O sedation is a preferred pharmacological method for managing anxiety in pediatric dental patients.[17] When utilized by a qualified dentist on carefully selected patients using appropriate equipment and techniques, N_2O is found to be extremely safe.[18] N_2O sedation was the most frequently used pharmacological BMT by pediatric dentists in this study; however, 22.8% of the clinicians stated that they had never used it in their present dental environment, mostly because the necessary equipment was not available in their hospital. This is consistent with a study conducted in Kuwait, which found that the major barriers to using N_2O sedation as a BMT were lack of equipment and training.[19] Similarly, a cross-sectional study reported similar findings, with 87.5% (49/58) of responders utilizing N_2O sedation as a BMT.[15] In addition, parental acceptance may influence the dentists' selection of BMTs. According to a study in Saudi Arabia, parents' attitudes toward N_2O application improved after their children were exposed to it during dental treatment.[20] In contrast, a study conducted in Kuwait revealed that most parents did not approve of using N_2O sedation as a BMT.[21]

According to our findings, GA was the second most popular method, with approximately 68.4% of the respondents using it. However, over a quarter of the study participants (29.8%) stated that they did not currently use GA in their dental practice. Of the participants, 8.8% stated that "the equipment was not available." This was confirmed by a previous study in Saudi Arabia, which reported that the primary barrier to employing this technique was access to operating rooms in hospitals or working in facilities without them.[22] Dental GA must be available to pediatric dentists because it is a crucial tool for managing precooperative, uncooperative, and patients with substantial dental needs.[1] The standard of dental care could be compromised by the unavailability of dental GA.

Protective stabilization is advised in certain circumstances, such as when uncooperative patients require immediate evaluation and/or treatment and when the patient poses a risk to staff or parents, particularly when sedation/GA is not likely to be employed. When providing a brief urgent treatment,[22,23] only well-trained personnel should utilize protective stabilization after obtaining informed consent.[24] Protective stabilization was reported to be rarely utilized by 45.6% and never utilized by 24.6% of the pediatric dentists who participated in the survey. Dentist-related factors, primarily due to their discomfort when employing this approach, were the most common barriers to not applying protective stabilization (22.8%). According to a study, 69% and 61% of pediatric dentists in the United Kingdom reported feeling uncomfortable using physical restraints and papoose boards, respectively. Certain studies have reported that culture significantly impacts parenting choices and the acceptance of different BMTs. For instance, physical restraint protective stabilization is more frequently utilized in

the United States,[12] whereas GA is more popular in the United Kingdom.[10] In Saudi Arabia, parents prefer GA to physical restraint or protective stabilization for the dental treatment of uncooperative youngsters over physical restraint or protective stabilization.[23] A decline in the use of more intense treatment approaches and a preference for pleasant or comfortable dental surroundings, such as pharmacological treatment, indicates that parents' preferences for their children's medical and dental care are changing over time.[25]

This survey, like most survey studies, had limitations. The external validity of our study was difficult because the results could not be extrapolated to a more universal population. The other significant limitation was the small number of respondents. It is unknown whether the results of this study would have been more accurate if a larger number of participants had been included. Furthermore, owing to the small sample size, the researchers were unable to thoroughly investigate the heterogeneity in using BMTs and barriers to their use by age, sex, years of experience, and other demographic and work-related characteristics. The use of oral and IV sedation in children undergoing dental procedures was low in this study and several earlier investigations. More well-designed and well-documented studies are required to evaluate and improve the applications of these techniques. Furthermore, a well-equipped dental clinic staffed by adequately qualified personnel enables the more efficient use of GA and sedation. Authorities should focus on enhancing the quality of medical facilities.

Conclusion

In Jeddah, Saudi Arabia, pediatric dentists most frequently use N_2O inhalation sedation, followed by protective stabilization with a general anesthetic. The use of pharmacological BMTs, including IV and oral sedation, is relatively low, with IV sedation being the least frequently used method. The barriers to using such pharmacological behavior guidance strategies are lack of training and unavailability of equipment/drugs.

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Conflicts of interest

There are no conflicts of interest.

Authors contributions

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Ethical policy and Institutional Review board statement

Not applicable.

Patient declaration of consent

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Data availability statement

Not available.

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