

GUIDELINES

for Teaching Pediatric Pain Control and Sedation to Dentists and Dental Students

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I. INTRODUCTION



The administration of local anesthesia, sedation, and general anesthesia is an integral part of the practice of dentistry. The American Dental Association (ADA) is committed to the safe and effective use of these modalities by appropriately educated and trained dentists.

Anxiety and pain control can be defined as the application of various physical, pharmacological, and psychological modalities for the prevention and treatment of preoperative, operative, and postoperative patient anxiety and pain to allow dental treatment to occur in a safe and effective manner. It involves all disciplines of dentistry and, as such, is one of the most important aspects of dental education. Pediatric patients are particularly susceptible to pain and anxiety associated with dental procedures and because of limited cognitive, psychological, and emotional coping strategies, completion of medically necessary dental care may be difficult or impossible.¹⁻³

These *Guidelines* are intended to provide direction for the teaching of initial competency in pediatric pain control, as well as minimal and moderate sedation, to dentists. They can be applied at all levels of dental education, from predoctoral education through postgraduate residency training and continuing education. The ADA recognizes the *Guidelines for the Use of Sedation and General Anesthesia by Dentists*, which describe best practices for clinical administration of sedation and anesthesia for adult patients.⁴ For pediatric patients undergoing minimal or moderate sedation, the ADA supports the use of guidelines from the American Academy of Pediatrics (AAP) and the American Academy of Pediatric Dentistry (AAPD), *Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures*.⁵

The definition of a pediatric patient as it relates to pain control and sedation is dependent on age, size, circumstance, and intent. Various regulatory agencies have identified a threshold of ages 10–13 years old for pediatric patients in areas such as medication dosage guides, research, training parameters, and privacy concerns. In regard to sedation in dentistry, sedation of pediatric patients is different from sedation of adults, and poses a higher risk. The highest risk exists in providing sedation for pediatric patients younger than six years of age.⁵ Additional consideration should be given to those for whom development is not defined by chronological age, including individuals

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with special health care needs, which interfere with their ability to undergo dental treatment. For the purposes of these teaching guidelines for minimal and moderate sedation, however, pediatric will be defined as prepubescent.

The predoctoral curriculum in anxiety and pain control in pediatric patients should include training in both non-pharmacological and pharmacological management techniques. Non-pharmacological modalities place emphasis on the interactions between the dentist, the staff, the patient, and the parent. Goals of pediatric behavior guidance include establishing communication; alleviating fear and anxiety; delivering quality dental care; building a relationship of trust; and promoting a positive attitude about oral health care in the pediatric patient. While the focus of these guidelines relates to pharmacological modalities, instruction in this area should also include non-pharmacologic management/behavioral guidance.

Dental students should acquire the knowledge and skills to administer local anesthesia and nitrous oxide inhalation sedation to adult and pediatric patients effectively and safely. This will alleviate anxiety and control pain, while minimizing adverse physiological or psychological side effects. The goals, prerequisites, didactic content, clinical experiences, faculty, and facilities described herein are intended to guide dental schools in planning predoctoral curricula. The curricula are designed to be taught by trained faculty, experienced in all pharmacological modalities, and to engender familiarity with the indications for different therapies, including analgesic medications, local anesthesia, sedation, and general anesthesia. Above all, the importance of understanding, recognizing, and managing emergencies related to local anesthesia and sedation administration cannot be overstated. While dental students must obtain certification in Basic Life Support for the Healthcare Provider approved by the American Heart Association or the American Red Cross, emphasis also should be placed on maintaining emergency preparedness in future practice, along with completing regular continuing education and as well as simulation practice.

Local anesthesia has been the foundation of pain control in dentistry. The use of local anesthesia in dentistry has a long record of safety; however, dentists must remain cognizant of the maximum recommended doses since high doses of local anesthetics may lead to significant cardiovascular and central nervous system depression. Less commonly appreciated is that local anesthetic toxicity may still manifest at lower than published maximum recommended doses. Recognition and swift treatment of both early and late signs of local anesthetic overdose are key to avoiding patient harm. Therefore, predoctoral students must not only routinely calculate appropriate local anesthetic doses for pediatric patients, but also must be trained in the management of local anesthetic toxicity. The addition of sedative medications with local anesthesia administration carries physiologic and pharmacological implications, including increased sedative effects. Recognizing the potential for enhanced sedative effects when the highest recommended doses of local anesthetic drugs are used in combination with other sedatives is especially critical in pediatric patients.⁵

Training in moderate sedation for pediatric patients requires a level of knowledge and clinical experience beyond the scope of most predoctoral education programs. While minimal sedation training may be more easily incorporated into the dental school curriculum, instruction in moderate sedation necessitates specific teaching requirements described herein that include additional didactic education hours and clinical case experiences that extend beyond most predoctoral curricula. These teaching requirements may be specifically addressed in either an advanced dental education program or in continuing education competency courses.

Whenever local anesthesia or sedation is employed, treatment areas must be properly equipped to manage emergencies, including having knowledge of appropriate physiologic monitoring equipment, a positive pressure oxygen delivery system, and emergency drugs and equipment suitable for the rescue of the patient being treated. Descriptions of recommended equipment and medications that may be necessary for emergency management in pediatric sedation are included as Appendices 3 and 4 in the AAP/AAPD *Guidelines*.⁵

The knowledge, skill, and clinical experience required for the safe administration of deep sedation or general anesthesia are beyond the scope of predoctoral and continuing education programs. Advanced dental education programs that teach deep sedation or general anesthesia to competency have specific teaching requirements described in the Commission on Dental Accreditation (CODA) standards for those advanced dental programs and represent the educational and clinical requirements for teaching deep sedation or general anesthesia in dentistry.

These teaching guidelines reinforce the understanding that the level of sedation is independent of the route of administration. Minimal, moderate, or deep sedation and general anesthesia may be achieved via any route of administration, and therefore these guidelines do not delineate the level of sedation by route of administration. Likewise, because sedation and general anesthesia are a continuum, it is imperative that training for any level of sedation emphasizes the possibility of a patient progressing to a level of sedation one level deeper than intended, regardless of the route of administration selected. Hence, the need for recognition and rescue from unintended deeper levels of sedation is repeated throughout these teaching guidelines.

The American Dental Association urges dentists to adhere to their own state's continuing education requirements and to participate regularly in update courses in these modalities to remain current in the expansion of knowledge, as well as to maintain competency. Ultimately, the objective of educating dentists to utilize pain control, and minimal and moderate sedation, is to enhance their ability to educate and provide treatment for the oral health care of any patient in a safe, effective, and accessible manner.

II. DEFINITIONS

METHODS OF ANXIETY AND PAIN CONTROL

analgesia: the diminution or elimination of pain

local anesthesia: the elimination of sensation, especially pain, in one part of the body by the topical application or regional injection of a drug

Note: Dentists must remain cognizant of the maximum recommended doses, as high doses of local anesthetics may lead to significant cardiovascular and central nervous system depression. Local anesthetic toxicity may still manifest at lower doses, and recognition and swift treatment of both early and late signs of local anesthetic overdose are key skills to preventing patient harm. Recognizing that this is especially critical in pediatric patients, there may be enhanced sedative effects when the highest recommended doses of local anesthetic drugs are used in combination with other sedatives.⁵



minimal sedation (previously known as anxiolysis): a minimally depressed level of consciousness, produced by a pharmacological method that retains the patient's ability to independently and continuously maintain an airway and respond *normally* to tactile stimulation and verbal command. Although cognitive function and coordination may be modestly impaired, ventilatory and cardiovascular functions are unaffected.⁶

The following two definitions apply to administration of pediatric minimal sedation:

maximum recommended dose (MRD): maximum FDA-recommended dose of a drug, as printed in FDA-approved labeling for pediatric use in the unmonitored home

dosing for minimal sedation via the enteral route: minimal sedation for pediatric patients may be achieved by the administration of a single dose of a single oral agent that is FDA-approved for pediatric use, not to exceed the maximum recommended dose (MRD)

In accord with the definition of minimal sedation, the drug or technique used should carry a margin of safety wide enough never to render unintended loss of consciousness. The use of the maximum recommended dose (MRD) to guide dosing for minimal sedation is intended to create this margin of safety.

The oral sedative agent must be administered by the dentist in the office setting. Redosing during a single treatment day with additional oral sedative medication is not recommended.

Minimal sedation for those beyond prepubescence may be achieved in accordance with adult training guidelines. In contrast to adult training guidelines for minimal sedation, which allow for divided doses to achieve the desired clinical effect (not to exceed the MRD), divided doses in pediatric enteral minimal sedation are not recommended.

Nitrous oxide-oxygen inhalation may be co-administered. If nitrous oxide-oxygen inhalation is combined with a sedative oral medication (e.g., benzodiazepines, antihistamines, opioids), or if nitrous oxide-oxygen is used in concentrations greater than 50%, the likelihood of entering a state of moderate or deep sedation increases, in which case the guidelines for moderate sedation or deep sedation will apply.⁶

The administration of one of the following during the single appointment will be considered moderate sedation, and the moderate sedation guidelines will apply:

- a. Two or more oral sedative medications
- b. One oral sedative medication exceeding the MRD
- c. Pharmacy-compounded sedative medication
- d. Parenterally administered sedative medication



moderate sedation: a drug-induced depression of consciousness during which patients respond *purposefully* to verbal commands, either alone or accompanied by light tactile stimulation. Bidirectional communication between patient and provider is maintained. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.⁶

In accord with this particular definition, the drugs or techniques used should carry a margin of safety wide enough to render unintended loss of consciousness unlikely. Repeated dosing of an agent before the effects of previous dosing can be fully appreciated may result in a greater alteration of the state of consciousness than the dentist's intent and is inappropriate for pediatric patients. A patient whose only response is reflex withdrawal from a painful stimulus is not considered to be in a state of moderate sedation.

Oral sedative agent(s) must be administered by the dentist in the office setting.

Moderate sedation for those beyond prepubescence may be achieved in accordance with adult training guidelines. In contrast to adult training guidelines for moderate sedation, repeated dosing or readministration is not recommended in pediatric moderate sedation unless intravenous access is in place.

Nitrous oxide–oxygen inhalation may be co-administered. If nitrous oxide–oxygen inhalation is combined with another sedative medication (e.g., benzodiazepines, antihistamines, opioids), or if nitrous oxide–oxygen is used in concentrations greater than 50%, the likelihood of entering a state of deep sedation increases, in which case the guidelines for deep sedation will apply.⁶

The following definition applies to administration of moderate and deeper levels of sedation:

titration: administration of incremental doses of a medication via the intravenous or inhalation route until a desired effect is reached. Knowledge of the time of onset, peak response and duration of action of each drug is essential to avoid unintended levels of sedation. Since peak onset of oral (enteral) sedatives is less predictable, titration of oral sedatives cannot be performed. While peak onset of intranasal, intramuscular, or submucosal administration is more predictable, it can still be difficult to determine when the previous dose has taken full effect to allow for predictable titration.

deep sedation: a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.⁶

general anesthesia: a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.⁶

Because sedation and general anesthesia are a continuum, it is not always possible to predict how an individual patient will respond. Hence, practitioners intending to produce a given level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended.⁶

For all levels of sedation, a qualified dentist must have the training, airway skills, drugs, monitors, and emergency equipment to identify and manage such an occurrence until either assistance arrives (emergency medical service) or the patient returns to the intended level of sedation without airway or cardiovascular complications.

ROUTES OF ADMINISTRATION

enteral: any technique of administration in which the agent is absorbed through the gastrointestinal (GI) tract or oral mucosa (i.e., oral, rectal)

inhalation: a technique of administration in which a gaseous or volatile agent is introduced into the lungs and whose primary effect is due to absorption through the gas/blood interface

parenteral: a technique of administration in which the drug bypasses the gastrointestinal (GI) tract (i.e., intramuscular (IM), intravenous (IV), intranasal (IN), submucosal (SM), subcutaneous (SC), intraosseous (IO))

transdermal: a technique of administration in which the drug is administered by patch or iontophoresis through skin

transmucosal: a technique of administration in which the drug is administered across mucosa such as intranasal, buccal, sublingual, or rectal

TERMS

continual: repeated regularly and frequently in a steady succession

continuous: prolonged without any interruption at any time

immediately available: on site in the facility and available for immediate use

may: indicates freedom or liberty to follow a reasonable alternative

must/shall: indicates an imperative need or duty; an essential or indispensable item; mandatory

pediatric: for the purposes of these guidelines for minimal and moderate sedation, pediatric age will be defined as prepubescent

pediatric dentistry: an age-defined specialty that provides both primary and comprehensive preventive and therapeutic oral health care for infants and patients through adolescence, including those with special health care needs⁷

qualified dentist: a dentist providing sedation and anesthesia in compliance with their state rules or regulations

rescue: rescue of a patient from a deeper level of sedation than intended is an intervention by a practitioner proficient in airway management and advanced life support. The qualified practitioner corrects adverse physiologic consequences of the deeper-than-intended level of sedation (e.g., hypoventilation, hypoxia, hypotension) and returns the patient to the originally intended level of sedation. It is not appropriate to continue the procedure at an unintended level of sedation.⁶

should: indicates the recommended manner to obtain the standard; highly desirable

time-oriented anesthesia record: documentation at appropriate time intervals of drugs, doses, behavioral and physiologic data obtained during patient monitoring

LEVELS OF KNOWLEDGE

familiarity: a simplified knowledge for the purpose of orientation and recognition of general principles

in-depth: a thorough knowledge of concepts and theories for the purpose of critical analysis and the synthesis of more complete understanding (highest level of knowledge)

LEVELS OF SKILL

competent: displaying special skill or knowledge derived from training experience

exposed: the level of skill attained by observation of or participation in a particular activity

AMERICAN SOCIETY OF ANESTHESIOLOGISTS (ASA) PATIENT PHYSICAL STATUS CLASSIFICATION⁸

Classification	Definition	Examples, including but not limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks, history (>3 months) of MI, CVA, TIA, or CAD/stents
ASA IV	A patient with severe systemic disease that is a constant threat to life	Examples include (but not limited to): recent (< 3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	

*The addition of “E” denotes emergency surgery: *(An emergency is defined as existing when delay in treatment of the patient would lead to a significant increase in the threat to life or body part)*

Pediatric Examples:

- ASA II ADHD, asthma, well controlled seizure disorders, stable hypothyroidism, well controlled DM, GERD
- ASA III Poorly controlled DM or HTN, morbid obesity, poorly controlled seizure disorders, cystic fibrosis, severe asthma, airway anomalies (e.g., Treacher Collins syndrome, Goldenhar syndrome)
- ASA IV Unrepaired complex congenital cardiac conditions, active oncology treatment

2020 PRACTICE GUIDELINES FOR PREOPERATIVE FASTING⁹

Ingested Material	Minimum Fasting Period
Clear liquids	2 hours
Breast milk	4 hours
Infant formula	6 hours
Nonhuman milk	6 hours
Light meal	6 hours
Fatty meal	8 hours

Pediatric Examples:

Clear liquids	water, apple juice
Nonhuman milk	cow, goat, fortified human milk
Light meal	dry toast, bowl of cereal
Fatty meal	eggs and bacon, pizza, macaroni and cheese

EDUCATION COURSES

Education may be offered at different levels (competency, update, survey courses, and advanced education programs). A description of these different levels follows:

- 1. Competency courses** are designed to meet the needs of dentists who wish to become competent in the safe and effective administration of local anesthesia and minimal and moderate sedation. They consist of lectures, demonstrations and sufficient clinical participation to assure the faculty that the dentist understands the procedures taught and can safely and effectively apply them. Faculty must assess and document the dentist's competency upon successful completion of such training. To maintain competency, periodic update courses must be completed.
- 2. Update courses** are designed for persons with previous training. They are intended to provide a review of the subject and an introduction to recent advances in the field. They should be designed didactically and clinically to meet the specific needs of the participants. Participants must have completed previous competency training (equivalent, at a minimum, to the competency course described in this document) and have current experience to be eligible for enrollment in an update course.
- 3. Survey courses** are designed to provide general information about subjects related to pain control and sedation. Such courses should be didactic and not clinical in nature, since they are not intended to develop clinical competency.
- 4. Advanced education courses** are a component of an advanced dental education program, accredited by the Commission on Dental Accreditation (CODA) in accord with the Accreditation Standards for advanced dental education programs. These courses are designed to prepare the graduate dentist or postdoctoral student in the most comprehensive manner to be competent in the safe and effective administration of minimal, moderate, and deep sedation and general anesthesia.

III. TEACHING PEDIATRIC PAIN CONTROL

These *Guidelines* present a basic overview of the recommendations for teaching pediatric pain control.

A. General Objectives

Upon completion of a predoctoral curriculum in pediatric pain control the dentist must:

1. Have an in-depth knowledge of those aspects of pediatric anatomy, physiology, pharmacology, and psychology involved in the use of various sedation and pain control methods
2. Be competent in evaluating the age, temperamental, psychological, and physical statuses of the patient, as well as the magnitude of the operative procedure, including the use of age and developmentally appropriate pain scales in order to select the proper regimen.
3. Be competent in monitoring vital functions
4. Be competent in prevention, recognition, and management of related complications, particularly airway complications
5. Have in-depth knowledge of the appropriateness of and the indications for medical consultation or referral
6. Be competent in the maintenance of proper records with accurate chart entries recording medical history, physical examination, vital signs, drugs administered, and patient response

B. Pain Control Curriculum Content

1. Philosophy of anxiety, pain control, and pediatric behavior guidance, including the nature and purpose of pain
2. Review of physiologic and psychologic aspects of anxiety and pain
3. Review of pediatric airway anatomy and physiology
4. Physiologic monitoring
 - a. Observation
 - (1) Central nervous system
 - (2) Respiratory system
 - (a) Oxygenation
 - (b) Ventilation
 - (3) Cardiovascular system
 - b. Monitoring equipment
5. Pharmacologic aspects of anxiety and pain control
 - a. Routes of drug administration
 - b. Sedatives and anxiolytics
 - c. Local anesthetics
 - d. Analgesics and antagonists
 - e. Adverse side effects
 - f. Drug interactions
 - g. Drug abuse

6. Control of preoperative and operative anxiety and pain
 - a. Patient evaluation
 - (1) Behavior and psychological status
 - (2) ASA physical status
 - (3) Type and extent of operative procedure
 - b. Nonpharmacologic methods
 - (1) Pediatric behavior guidance strategies
 - (a) Communicative strategies of patient management
 - (b) Distraction
 - (c) Positive reinforcement
 - (d) Tell-show-do
 - (e) Memory restructuring
 - (f) Systematic desensitization
 - c. Local anesthesia
 - (1) Review of related anatomy and physiology
 - (2) Pharmacology
 - (a) Focus on weight-based calculations for pediatric patients
 - (aa) Adjustments for overweight and obese patients
 - (b) Toxicity
 - (c) Selection of agents
 - (3) Techniques of administration
 - (a) Topical
 - (b) Infiltration (supraperiosteal)
 - (c) Nerve block — maxilla — to include:
 - (aa) Posterior superior alveolar
 - (bb) Infraorbital
 - (cc) Nasopalatine
 - (dd) Greater palatine
 - (ee) Maxillary (2nd division)
 - (ff) Other blocks
 - (d) Nerve block — mandible — to include:
 - (aa) Inferior alveolar-lingual
 - (bb) Mental — incisive
 - (cc) Buccal
 - (dd) Gow-Gates
 - (ee) Closed mouth
 - (e) Alternative injections — to include:
 - (aa) Periodontal ligament
 - (bb) Dental intraosseous
 - d. Prevention, recognition, and management of complications and emergencies

C. Sequence of Pain Control Didactic and Clinical Instruction

Beyond the basic didactic instruction in local anesthesia, additional time should be provided for demonstrations and clinical practice of the injection techniques. The teaching of other methods of anxiety and pain control, such as the use of analgesics and enteral, inhalation, and parenteral sedation, should be coordinated with a course in pharmacology. By this time the student also will have developed a better understanding of patient evaluation and the problems related to prior patient care. As part of this instruction, the student should be taught the techniques of venipuncture and physiologic monitoring. Time should be included for demonstration of minimal and moderate sedation techniques.

Following didactic instruction in minimal and moderate sedation, the student must receive sufficient clinical experience to demonstrate competency in those techniques in which the student is to be certified. It is understood that not all institutions may be able to provide instruction to the level of clinical competence in pharmacologic sedation modalities to all students. The amount of clinical experience required to achieve competency will vary according to patient population (i.e., healthy versus medically complex), student ability, teaching methods, and the anxiety and pain control modality taught.

Throughout both didactic and clinical instruction in anxiety and pain control, the importance of non-pharmacologic pediatric guidance throughout the sedation procedure should be stressed. Instruction should emphasize that the need for sedative techniques is related to the patient's age, level of anxiety, cooperation, medical condition, and the planned procedures.

D. Faculty

Instruction must be provided by qualified faculty for whom pediatric sedation and pain control are areas of major proficiency, interest, and concern.

E. Facilities

Competency courses must be presented in facilities appropriately prepared for pediatric patient care, with drugs and equipment immediately available for the management of emergencies.

IV. TEACHING ADMINISTRATION OF PEDIATRIC MINIMAL SEDATION



The faculty responsible for curriculum in pediatric minimal sedation techniques must be familiar with the ADA Policy Statement, *Guidelines for the Use of Sedation and General Anesthesia by Dentists*; the Commission on Dental Accreditation's *Accreditation Standards for Dental Education Programs*; and the AAP/AAPD *Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures*.

These various guidelines and standards present a basic overview of the recommendations for teaching pediatric minimal sedation. These include courses in nitrous oxide–oxygen inhalation sedation and minimal sedation, most likely administered via the enteral route in pediatric patients. Minimal sedation in pediatric patients may be achieved by the administration of a single dose of a drug, not to exceed the maximum recommended dose (MRD). The administration of more than one drug, one drug exceeding the MRD, or concomitant use of nitrous oxide with another drug or use at concentrations greater than 50% during a single appointment may produce moderate or deep levels of sedation, wherein guidelines for those levels of sedation apply, as indicated by the patient's response.⁶

General Objectives

Upon completion of a competency course in pediatric minimal sedation, the dentist must be able to:

1. Describe the anatomy and physiology of the respiratory, cardiovascular, and central nervous systems, as they relate to the above techniques, and the unique anatomy and physiology of the child patient and the challenges that they present
2. Describe the pharmacological effects of sedative medications
3. Describe the methods of obtaining a medical history and conducting an appropriate physical examination
4. Apply these methods clinically in order to obtain an accurate evaluation
5. Use this information clinically for American Society of Anesthesiologists (ASA) classification risk assessment and pre-procedure fasting instructions
6. Choose the most appropriate technique for the individual patient
7. Use appropriate physiologic monitoring equipment
8. Describe the physiologic responses that are consistent with pediatric minimal sedation, including retention of the patient's ability to independently and continuously maintain an airway and respond *normally* to tactile stimulation and verbal command, as well as maintain respiratory and cardiovascular stability
9. Understand the sedation/general anesthesia continuum
10. Demonstrate the ability to diagnose and treat emergencies related to the next deeper level of anesthesia than intended



MINIMAL SEDATION (NITROUS OXIDE-OXYGEN): INHALATION

A. Minimal Sedation (Nitrous Oxide–Oxygen): Inhalation Course Objectives

In addition to the general objectives listed above, upon completion of a competency course in inhalation sedation techniques, the dentist must be able to:

1. Describe the basic components of inhalation sedation equipment
2. Discuss the function of each of these components
3. List and discuss the advantages and disadvantages of inhalation sedation
4. List and discuss the indications and contraindications of inhalation sedation
5. List the complications associated with inhalation sedation
6. Discuss the prevention, recognition, and management of these complications
7. Administer inhalation sedation to pediatric patients in a clinical setting in a safe and effective manner
8. Discuss the abuse potential, occupational hazards, and other untoward effects of inhalation agents
9. List and discuss failed pediatric inhalation sedation and alternative care

B. Minimal Sedation (Nitrous Oxide–Oxygen): Inhalation Course Content

1. Historical, philosophical, and psychological aspects of anxiety and pain control
2. Patient evaluation and selection through review of medical history taking, physical diagnosis, and psychological considerations
3. Definitions and descriptions of physiological and psychological aspects of anxiety and pain
4. Description of the stages of drug-induced central nervous system depression through all levels of consciousness and unconsciousness, with special emphasis on the distinction between the conscious and the unconscious state
5. Review of pediatric respiratory and circulatory physiology and related anatomy
6. Pharmacology of agents used in inhalation sedation, including drug interactions and incompatibilities
7. Indications and contraindications for use of inhalation sedation
8. Review of dental procedures possible under inhalation sedation
9. Patient monitoring using observation and monitoring equipment (e.g., pulse oximetry), with particular attention to vital signs and reflexes related to pharmacology of nitrous oxide
10. Importance of maintaining proper records with accurate chart entries recording medical history, physical examination, vital signs, drugs and doses administered, and patient response
11. Discussion of recovery from inhalational minimal sedation and appropriate discharge criteria
12. Prevention, recognition and management of complications and emergencies

13. Administration of local anesthesia in conjunction with inhalation sedation techniques
14. Description, maintenance, and use of inhalation sedation equipment
15. Description, maintenance, and use of emergency equipment and drugs
16. Introduction to potential health hazards of trace anesthetics and proposed techniques for limiting occupational exposure
17. Discussion of abuse potential
18. Discussion of failed pediatric inhalation sedation and alternative care

C. Minimal Sedation (Nitrous Oxide–Oxygen) – Inhalation Course Duration

While length of a course is only one of the many factors to be considered in determining the quality of an educational program, the course should be a minimum of 14 didactic hours, which may overlap with adult inhalation sedation instruction, in addition to management of clinical pediatric dental cases, during which clinical competency in inhalation sedation technique is achieved. The pediatric inhalation sedation course most often is completed as a part of the predoctoral dental education program. However, the course may be completed in a postdoctoral continuing education competency course.

D. Participant Evaluation and Documentation of Minimal Sedation (Nitrous Oxide–Oxygen): Inhalation Instruction

Competency courses in inhalation sedation techniques must afford participants with sufficient clinical experience to enable them to achieve competency. This experience must be provided under the supervision of qualified faculty and must be evaluated. The course director must certify the competency of participants upon satisfactory completion of training. Records of the didactic instruction and clinical experience, including the number of patients treated by each participant must be maintained and available. Participants must document current certification in Basic Life Support for Healthcare Providers.

E. Minimal Sedation (Nitrous Oxide–Oxygen): Inhalation Faculty

The course should be directed by a dentist or physician qualified by experience and training in the care of pediatric patients, including those with special health care needs. This individual should possess an active state permit or license to administer moderate sedation to pediatric patients, and a minimum of three years of experience administering sedation to pediatric patients, which may include accredited postdoctoral training in pediatric anxiety and pain control. In addition, the participation of highly qualified individuals in related fields, such as anesthesiologists, pharmacologists, internists, cardiologists, and psychologists, should be encouraged.

The participant-faculty ratio should not exceed 10:1 during pediatric inhalation sedation instruction for appropriate supervision during the clinical phase of instruction; a 1:1 ratio is recommended during the early phase of clinical instruction.

The faculty should provide a mechanism whereby the participant can evaluate the performance of those individuals who present the course material.



F. Minimal Sedation (Nitrous Oxide–Oxygen): Inhalation Facilities

Competency courses must be presented in facilities appropriately prepared for pediatric patient care, with drugs and equipment immediately available for the management of emergencies.

MINIMAL SEDATION: ENTERAL

A. Minimal Sedation: Enteral Course Objectives

In addition to the general objectives listed above, upon completion of a competency course in minimal sedation techniques, the dentist must be able to:

1. List and discuss the advantages and disadvantages of enteral minimal sedation
2. List and discuss the indications and contraindications for the use of enteral minimal sedation
3. List the complications associated with enteral minimal sedation
4. Discuss the prevention, recognition, and management of these complications, including patient rescue
5. Administer enteral minimal sedation to pediatric patients in a clinical setting in a safe and effective manner
6. Discuss the abuse potential, occupational hazards, and other effects of enteral and inhalation agents
7. Discuss the pharmacology of the enteral and inhalation drugs selected for administration
8. Discuss the precautions, contraindications, and adverse reactions associated with the select enteral medications
9. Discuss recovery from enteral minimal sedation and appropriate discharge criteria
10. Describe a protocol for management of emergencies in the dental office and list and discuss the airway maneuvers, emergency drugs, and equipment required for management of life-threatening situations
11. Demonstrate the ability to manage life-threatening emergency situations, including current certification in Basic Life Support for Healthcare Providers. Training in advanced airway management (e.g., Pediatric Advanced Life Support (PALS)) is strongly suggested
12. List and discuss failed pediatric sedation and alternative care

B. Minimal Sedation: Enteral Course Content

1. Historical, philosophical, and psychological aspects of anxiety and pain control
2. Preventive and non-restorative strategies that may provide an alternative to the use of sedation/general anesthesia, such as Silver Diamine Fluoride (SDF), Alternative Restorative Treatment (ART), and Interim Therapeutic Restoration (ITR)
3. Patient evaluation and selection through review of age, temperament/behavior, medical history taking, and physical diagnosis
4. Definitions and descriptions of pediatric physiological and psychological aspects of anxiety and pain



5. Description of the stages of drug-induced central nervous system depression through all levels of sedation, with special emphasis on the distinction between the various levels of sedation
6. Review of pediatric respiratory and circulatory physiology and related anatomy
7. Pharmacology of agents used in enteral minimal sedation, including dosing, administration techniques and rates, drug interactions, and incompatibilities. Emphasis on unintended deeper level of sedation including monitoring, management and reversal options.
8. Indications and contraindications for use of enteral minimal sedation
9. Review of dental procedures possible under enteral minimal sedation
10. Administration of local anesthesia in conjunction with enteral minimal sedation
11. Pediatric patient monitoring using observation monitoring equipment, with particular attention to vital signs and monitoring of consciousness level
12. Maintaining proper records with accurate chart entries recording medical history, physical examination including weight, NPO status, informed consent, medications including local anesthetics and doses, and time-oriented sedation/anesthesia record, including any monitored physiological parameters, recovery, and readiness for discharge
13. Prevention, recognition, and management of complications and life-threatening situations including patient rescue
14. Description, maintenance, and use of emergency equipment and drugs
15. Discussion of abuse potential of sedative medications
16. List and discuss failed pediatric sedation and alternative care

C. Minimal Sedation: Enteral Course Duration and Documentation

While course duration is only one of the many factors to be considered in determining the quality of an educational program, the course should include a minimum of 20 didactic hours and a minimum of 10 individually managed clinical sedation cases involving pediatric patients eight years old and younger, during which competency is demonstrated. The faculty should schedule participants to return for additional clinical experience if competency has not been achieved in the time allotted. The educational course may be completed in a predoctoral dental education curriculum or a postdoctoral continuing education competency course.

Participants must document current certification in Basic Life Support for Healthcare Providers. For trainees providing enteral minimal sedation to pediatric patients, training in advanced airway management (e.g., Pediatric Emergency Assessment and Stabilization (PEARS)) or pediatric life support (e.g., Pediatric Advanced Life Support (PALS)) is recommended. Simulation training in the recognition and management of respiratory emergencies is highly recommended.

D. Participant Evaluation and Documentation of Minimal Sedation: Enteral Instruction

Competency courses in pediatric enteral minimal sedation techniques must afford participants with sufficient clinical understanding to enable them to achieve competency. The course



director must certify the competency of participants upon satisfactory completion of the course. Records of the course instruction must be maintained and available.

E. Minimal Sedation: Enteral Faculty

The course should be directed by a dentist or physician qualified by experience and training in care of pediatric patients, including pediatric patients with special health care needs. This individual should possess an active permit or license to administer moderate sedation to pediatric patients in at least one state, have had at least three years of experience, including the individual's formal postdoctoral training in anxiety and pain control. In addition, the participation of highly qualified individuals in related fields, such as anesthesiologists, pharmacologists, internists, cardiologists, and psychologists, should be encouraged. The faculty should provide a mechanism whereby the participant can evaluate the performance of those individuals who present the course material.

The participant-faculty ratio should not exceed 4:1 during enteral minimal sedation instruction for appropriate supervision during the clinical phase of instruction; a 1:1 ratio is recommended during the early phase of clinical instruction.

F. Minimal Sedation: Enteral Facilities

Competency courses must be presented in facilities appropriately prepared for pediatric patient care, including drugs and equipment immediately available for the management of emergencies.

V. TEACHING ADMINISTRATION OF PEDIATRIC MODERATE SEDATION



These *Guidelines* present a basic overview of the requirements for a competency course in pediatric moderate sedation. These include courses in enteral and parenteral pediatric moderate sedation. The teaching guidelines contained in this section on moderate sedation differ slightly from documents in medicine to reflect the differences in delivery methodologies and practice environment in dentistry.

Completion of a prerequisite nitrous oxide-oxygen competency course is required for participants utilizing nitrous oxide-oxygen for moderate sedation.

A. Pediatric Moderate Sedation Course Objectives

Upon completion of a course in pediatric moderate sedation, the dentist must be able to:

1. List and discuss the advantages and disadvantages of moderate sedation
2. Discuss the limitations of moderate sedation when treating pre-cooperative pediatric patients
3. Describe and demonstrate the techniques of intravenous access, intramuscular injection, and other parenteral techniques (e.g., intranasal)
4. Discuss the pharmacology of the drug(s) selected for administration
5. Discuss the precautions, indications, contraindications, and adverse reactions associated with the drug(s) selected



6. Discuss the pharmacological effects of combined drug therapy, their implications and their management, including an understanding that nitrous oxide–oxygen when used in combination with sedative agent(s) may produce moderate or deep sedation or general anesthesia
7. Administer moderate sedation to pediatric dental patients in a clinical setting in a safe and effective manner
8. Discuss recovery from moderate sedation and appropriate discharge criteria
9. List and discuss the prevention, recognition, and management of complications associated with moderate sedation
10. List and discuss the emergency drugs and equipment required for the prevention and management of emergency situations
11. Describe a protocol for management of emergencies in the dental office. Reinforce the need to practice drills regularly in practice setting
12. Discuss principles of pediatric advanced life support, or an appropriate pediatric dental sedation/anesthesia emergency course equivalent
13. Demonstrate the ability to recognize and treat emergencies including reversal and rescue during an unintended deeper level of sedation
14. Discuss the abuse potential, occupational hazards, and other untoward effects of the agents utilized to achieve moderate sedation
15. List and discuss failed pediatric sedation and alternative care

B. Pediatric Moderate Sedation Course Content

1. Historical, philosophical, and psychological aspects of anxiety and pain control
2. Patient evaluation and selection through review of age, temperament/behavior, medical history taking, and physical diagnosis, including Mallampati scoring and tonsillar assessment
3. Use of patient history and examination for ASA classification, risk assessment, and pre-procedure fasting instructions
4. Definitions and descriptions of physiological and psychological aspects of anxiety and pain
5. Description of the sedation/general anesthesia continuum, with special emphasis on the distinction between minimal, moderate, and deep sedation and general anesthesia
6. Review of respiratory and circulatory physiology and related anatomy
7. Pharmacology of local anesthetics and agents used in moderate sedation, including drug interactions and contraindications with emphasis on the role of local anesthetic toxicity in producing unintended deeper levels of sedation. The use of reversible sedation drugs is encouraged
8. Indications and contraindications for use of moderate sedation
9. Review of dental procedures possible under moderate sedation
10. Review of enteral moderate sedation techniques



11. Intravascular access: anatomy, equipment, and techniques for intravenous and intraosseous access. Prevention, recognition, and management of complications of venipuncture and emergency intraosseous access techniques
12. Review of parenteral moderate sedation techniques
13. Description and rationale for the technique to be employed
14. Description, maintenance, and use of moderate sedation monitors and equipment
15. Patient monitoring using patient observation and monitoring equipment, with particular attention to vital signs, ventilation/oxygenation, and level of consciousness. Monitoring equipment reviewed should include: pulse oximeter, automated non-invasive blood pressure devices, electrocardiogram, capnograph, and pretracheal stethoscope
16. Personnel requirements and roles of auxiliaries in monitoring sedation
17. Maintenance of proper records with accurate chart entries recording medical history, physical examination including weight, NPO status, informed consent, medications including local anesthetics and doses, and time-oriented sedation/anesthesia record, including any monitored physiological parameters, recovery, and readiness for discharge
18. Prevention, recognition, and management of complications and emergencies, with emphasis on pediatric airway maintenance and cardiovascular support
19. List and discuss failed pediatric sedation and alternative care
20. Discussion of abuse potential of sedative medications

C. Pediatric Moderate Sedation Course Duration and Documentation

The course must include:

- A minimum of 60 hours of didactic instruction
- A minimum of 20 individually managed clinical cases of moderate sedation for pediatric patients eight years old and younger; at least 15 patients must be under six years of age
- Certification of competence in pediatric moderate sedation technique(s)
- Certification of competence in rescuing patients from a deeper level of sedation than intended, including managing the airway, intravascular, or intraosseous access, and reversal medications
- Provision by course director or faculty of additional clinical experience if participant competency has not been achieved in time allotted
- Records of instruction and clinical experiences (i.e., number of patients managed by each participant in each modality/route) that are maintained and available for participant review

Dentists providing moderate sedation to pediatric patients must also receive training in advanced emergency recognition and airway management ideally incorporating live patient experience or emergency management training using high fidelity simulation. As an alternative, Pediatric Advanced Life Support (PALS) or Pediatric Emergency Assessment, Recognition and Stabilization (PEARS) courses or other courses which provide similar training may be used.

**D. Pediatric Moderate Sedation Documentation of Instruction**

The course director must certify the competency of participants upon satisfactory completion of training in each moderate sedation technique, including instruction, clinical experience, managing the airway, intravascular/intraosseous access, and reversal medications.

E. Pediatric Moderate Sedation Faculty

The course should be directed by a dentist or physician qualified by experience and training in care of pediatric patients, including those with special health care needs. This individual should possess an active state permit or license to administer moderate sedation to pediatric patients, and a minimum of three years of experience administering sedation to pediatric patients, which must include accredited postdoctoral training in pediatric anxiety and pain control. In addition, the participation of highly qualified individuals in related fields, such as anesthesiologists, pharmacologists, internists, cardiologists, and psychologists, should be encouraged.

The participant-faculty ratio should not exceed 4:1 during moderate sedation instruction for appropriate supervision during the clinical phase of instruction. A 1:1 ratio is recommended during the early phases of clinical instruction.

Course and faculty evaluations should be completed by participants and made available for review.

F. Pediatric Moderate Sedation Facilities

Competency courses must be presented in facilities appropriately prepared for pediatric patient care, with drugs and equipment immediately available for the management of emergencies. These facilities may include dental and medical schools or offices, hospitals, and surgical centers.

ENDNOTES

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