Pediatric Dentistry

5th Year



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Pharmacologic Management of Patient Behavior

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PHARMACOLOGIC MANAGEMENT

Pharmacologic management is a broad term that describes the use of drugs to manage the behavior of pediatric patients undergoing dental procedures. Pharmacologic management is further divided into two subcategories, sedation and general anesthesia.

Degree of sedation:

Minimal sedation – (anxiolysis) a minimally depressed level of consciousness, produced by a pharmacologic method that retains the patient's ability to maintain an airway independently and continuously and respond normally to tactile stimulation and verbal commands. Although cognitive function and coordination may be modestly impaired, ventilator and cardiovascular functions are unaffected.

Moderate sedation – (Conscious Sedation) a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

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

General anesthesia – a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to maintain ventilatory function independently 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.

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Practitioners intending to produce minimal or moderate sedation should be able to diagnose and manage the physiologic consequences of patients whose level of sedation becomes deeper than initially intended. The term "**rescue**" is often used to describe this management, and refers to steps taken to return the patient to the initially desired level of sedation.

The goals of sedation for the pediatric patient are

(1) to guard the patient's safety and welfare;
(2) to minimize physical discomfort and pain;
(3) to control anxiety, minimize psychological trauma, and maximize the potential for amnesia;
(4) to control behavior or movement so that the procedure can be completed safely;
(5) to return the patient to a physiologic state in which safe discharge, as determined according to recognized criteria, is possible.

Indications for pharmacological behavior management technique:

1. Very young children.
2. Children with reduced (psychological or emotional) maturity or those with (cognitive, physical or mental) disability.
3. Children who are intensely fearful and anxious.
4. Children who require extensive dental care and would benefit from prolonged dental visit.
5. Children who have allergy to local anesthesia.

Pre-treatment Documentation and Assessment

Documentation

Each sedation or general anesthetic procedure should be documented in the patient's record by the practitioner. Documentation should include the following:

1. Rationale for sedation or general anesthesia: the dental surgeon should briefly document the reason for the need for sedation or G.A.
2. Informed consent: each patient, parents or other responsible individual is entitled to be informed regarding benefits, risks, alternatives to sedation or G.A. and the patient record should document that appropriate informed consent was obtained.
3. Instructions to parents or responsible individual: The dental surgeon should provide verbal and written instructions (to parents and responsible individual) which should include clear explanation of pre and post anesthesia precautions potential or anticipated behavior, and limitation of activities.
4. Dietary instructions: food and liquids intake should be limited prior to treatment.

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Sedation in pediatric dentistry

The decision to sedate a child requires careful consideration by an experienced team. The choice of a particular technique, sedative agent and route of delivery should be made at a prior consultation appointment to determine the suitability of the child (and their parents) to a specific technique.

The use of any form of sedation in children presents added challenges to the clinician. During sedation, a child's responses are more unpredictable than that of adults. Their proportionally smaller bodies are less tolerant to sedative agents and they may be easily over-sedated.

Anatomically differences in the pediatric airways include:

- The vocal cords positioned higher and more anterior.
- The smallest portion of pediatric airway is at the level of the subglottis (below cords) at the level of the cricoid ring.
- Children have relatively larger tongue and epiglottis.
- Possible presence of large tonsillar/adenoid mass.
- Larger head to body size ratio in children.
- The mandible is less developed and retrognathic in younger children and infants.
- Children have smaller lung capacity and higher metabolic rate resulting in a smaller oxygen reserve. Hence, children desaturate more quickly than adults do.

Patient preoperative assessment

The preoperative assessment is among the most important factors when choosing a particular form of sedation. This assessment must include:

1. A thorough medical and dental history that include:

1. Allergies or adverse drug reaction that might increase the potential for airway obstruction, such as a history of snoring or obstructive sleep apnea.
2. Current medications (if any including the dose, time, rout and site of administration)
3. Previous hospitalization and past operations (date and purpose)
4. History of previous treatment under general anesthesia or sedation and any associated complications.
5. Family history of diseases or disorders especially those might affect sedation and general anesthesia.
6. Patient medical status (diseases, disorders or physical abnormalities):
   - History of recent respiratory illness or current infections.
   - Assessment of the airway to determine suitability for conscious sedation or general anesthesia (GA).

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- Fasting requirements and the ability of the career to comply with instructions.
- Proposed procedures being performed.
- Patient's weight and vital signs.

7. Review of body systems.
8. Age (in years and months) and weight.
9. Name, address, and contact information of the child's home.

2. The physical evaluation which should include the following:

a. Height and weight in kilograms or pounds.
b. Vital signs, including heart and respiratory rates and blood pressure. If determination of baseline vital signs is prevented by the patient's physical resistance or emotional condition, the reason(s) should be documented.
c. Evaluation of airway patency, to include tonsillar size and anatomic abnormalities that may increase the risk of airway obstruction (e.g., mandibular hypoplasia, large, short neck, limited mandibular range of motion).
d. Physical abnormalities or conditions that may affect routine intraoperative monitoring (e.g., recent orthopedic injuries to arms or legs, active skin rashes).
e. ASA classification.

****Note:** American Society of Anesthesiologists' Physical Status (ASA)

P1 A normal healthy patient
P2 A patient with mild systemic disease
P3 A patient with severe systemic disease
P4 A patient with severe systemic disease that is a constant threat to life
P5 A moribund patient who is not expected to survive without the operation
P6 A declared brain-dead patient whose organs are being removed for donor purposes

So according to ASA, generally, patients categorized into classes III and IV are better managed in a hospital setting.

Preoperative dietary instructions:

Dietary instructions should be as follows:

1. No milk or solid foods for 6 hours for children 6 to 36 months old and for 6 to 8 hours for children 36 months and older
2. Clear liquids up to 3 hours before the procedure for children aged 6 months and older.
3. Let everyone in the home know the above information, because siblings or others living in the home often unknowingly feed the child.

Note: Patients with a known history of gastroeosophageal reflux or with a high potential for aspiration would benefit from an appropriate increase in fasting duration.

ROUTES OF DRUG ADMINISTRATION

Inhalational Route
Enteral Route
Rectal Route
Intramuscular Route
Submucosal and Subcutaneous Routes
Intravenous Route

Onset of action

Oral	30 min
Inhalation	2-3 min
IM	5-10 min
IV	20 to 40 seconds

Peak clinical effect

Oral	60min
Inhalation	3-5
IM	30min
IV	1-10min

Titration

Ability to administer small increments of a drug to achieve a desire clinical effect

Oral	Titration not possible
Inhalation	Titration posssible
IM	Titration not possible
IV	Titration posssible

Recovery

Need for an escort (somebody) to leave the office

Oral	recovery not complete even after 2-3hrs
Inhalation	recovery almost always complete, may dicharged alone
IM	not complete need escort

Enteral Route

Enteral sedation is achieved by drugs that are swallowed and absorbed through the digestive or enteric system. The practice of having parents administer oral medications to children prior to arrival at the office should be avoided. The onset approximately 30 minutes after administration, with peak effect noted by 60 minutes. The taste may be quite objectionable, especially to very young children. This can usually be overcome when the drug is mixed with a palatable liquid.

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Advantages	Disadvantages
• Universally accepted • Ease of administration • Low cost • Decreased incidence and severity of adverse reactions • No pricks (needles, syringes), No equipment is required. • No special training	• Reliance • Prolonged latent period • Erratic & incomplete absorption of drugs from GIT • Inability to titrate • Prolonged duration of action • Inability to radially lightened or deepened the level of sedation

Rectal route

The use of suppositories has a limited history in pediatric dentistry. Drugs administered through this route are absorbed through two different vascular systems, one of which delivers agents to the liver while the second bypasses the liver. As a result, wide variations of bioavailability are seen after rectal administration. Absorption is often irregular and incomplete. For this reason, and because of the tendency toward mucosal irritation from drugs delivered via this route, rectal administration is not recommended for pediatric sedation.

Complication

- Rectal mucosal irritation
- Initiation of bowel movement
- Risk of over sedation

Indications

- Unwilling to take orally
- Nausea & vomiting
- Patient objecting injection
- Post-op control of pain

Advantages	Disadvantages
• Low cost • Ease of administration • No pricks • Absorb directly into systemic circulation (rapid onset of action) • Bypassing entero hepatic circulation	• Inconvenience to the administer • Variable absorption • Inability to reverse • Inability to titrate • Possible intestinal irritation • Prolonged recovery

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Intra muscular route

Intramuscular administration relies upon the high vascularity of muscle tissue to achieve a moderately rapid onset of action, usually within 5 to 10 minutes. When properly administered, intramuscular injection provides a more rapid onset and offset as compared with enteral techniques.

Indications

- Other controllable routes are unavailable or have proved ineffective.
- Prior to IV sedation or general anesthesia.

Complications

- Nerve injury
- Intra-vascular injection
- Air embolism
- Periostitis
- Hematoma
- Abscess
- Cyst
- Necrosis

Advantages	Disadvantages
● Rapid onset of action ● Maximum clinical effect within 30min ● More reliable absorption than oral or rectal sedation ● Pt cooperation is not required	● Inability to titrate ● Inability to reverse the drug action ● Prolonged duration of drug effect ● Injection needed and its possible injury

Intravenous Route

The IV route of drug administration represents the most effective method of ensuring predictable and adequate sedation in virtually all patients. Effective blood levels of drugs are achieved quite rapidly.

The use of intravenous conscious sedation in pediatric dentistry is somewhat restricted to certain types and ages of patients. Venipuncture is difficult to accomplish in the very young or the combatant child. Such difficulty is attributable to smaller vein size and availability together with the need to restrain the patient. Because of this, the technique is often more suitable for the apprehensive preteen and adolescent patient.

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Advantages	Disadvantages
● Rapid onset of action ● Easily titrated ● Rapid recovery ● Minimal side effects ● Emergency IV access available	● Venipuncture is required ● More monitoring is necessary ● Hematoma at the site of injection ● Most agents cannot be reversed by antagonistic agents

Inhalation

The inhalational route is a highly effective route of administration, allowing nonirritating gases and volatile drugs to be inhaled and absorbed directly through the pulmonary epithelium and mucous membranes of the respiratory tract into the circulation. The almost instantaneous absorption of agents delivered through this route is due to the large surface area of the lung. Equilibrium is quickly established among the partial pressure of the drug in the alveolar gas space, serum, and target tissues in the brain. As a result, inhaled anesthetic gases are easily titrated by adjustment of the amount of inhaled gas, provided the rate and depth of ventilation are adequately controlled.

Indications

- Anxiety
- Medically compromised patients
- Gagging

Contraindications

- Severe behavioral problems
- Acute respiratory conditions
- Inability to communicate and Learning difficulties
- Very young children
- Fear of the mask

Advantages	Disadvantages
● Rapid onset ● Peak clinical actions ● Titration possible ● Depth of sedation can be altered ● Rapid and complete recovery ● Duration at discretion of administration ● No injection ● Safe and no systemic effects ● Can be used instead of topical anesthesia	● High cost equipment ● Space in dental office ● Potency ● Training of staff ● Occupational hazard ● Cooperation is required ● Raise pain reaction threshold ● Potential problems with chronic exposure

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