

An Algorithm-Based Approach for Behavior and Disease Management in Children

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Abstract: *Pharmacologic behavior management for dental treatment is an approach to provide invasive yet compassionate care for young children; it can facilitate the treatment of children who otherwise may not cooperate for traditional in-office care. Some recent highly publicized procedural sedation-related tragedies have drawn attention to risks associated with pharmacologic management. However, it remains widely accepted that, by adhering to proper guidelines, procedural sedation can assist in the provision of high-quality dental care while minimizing morbidity and mortality from the procedure. The purpose of this paper was to propose an algorithm for clinicians to consider when selecting a behavior and disease management strategy for early childhood caries. This algorithm will not ensure a positive outcome but can assist clinicians when counseling caregivers about risks, benefits, and alternatives. It also emphasizes and underscores best-safety practices. (Pediatr Dent 2018;40(2):89-92) Received December 12, 2017 | Last Revision February 21, 2018 | Accepted February 28, 2018*

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Children with early childhood caries (ECC) requiring restorative dental care often exhibit behavioral challenges. Dentists who care for children employ a continuum of behavior guidance strategies, ranging from traditional communicative techniques to more advanced pharmacologic management such as procedural sedation and general anesthesia (GA).¹ The use of sedation/GA has allowed many highly anxious children—both cooperative and uncooperative—to receive dental treatment that otherwise would not have been delivered safely using conventional means.

A key objective for the use of procedural sedation/GA, as outlined by the American Academy of Pediatric Dentistry (AAPD), is to protect the developing psyche.² GA and sedation are two of several behavior guidance options, but at the same time dentists who care for children have a host of behavior and disease management options available that should be discussed during informed consent for an individualized plan of care.

Recently, pharmacologic management for pediatric dental treatment has received increased attention due to unexpected morbidity and mortality. Such incidents highlight the gravity of this approach and illuminate the importance of counseling families about risks (i.e., complications, including death) and alternative behavior and disease management strategies.³ In a continuing effort to promote safety and reduce adverse events, in 2016 the AAPD and the American Academy of Pediatrics

(AAP) updated their existing joint guidelines by supporting structured sedation protocols.²

The purpose of this paper was to propose a decision-tree for dentists to consider when discussing behavior and disease management options with caregivers of young children with early childhood caries. Based on expert opinion and current literature describing case selection for advanced pharmacologic behavior guidance, this decision-tree offers an algorithm for treatment planning and a template for counseling families when considering the risks, benefits, and options for behavior and disease management. The algorithm is applicable when the clinical presentation calls for restorative or surgical dental treatment in a non-emergent scenario absent signs of systemic involvement (e.g., fever, extra-oral swelling, malaise, pain, etc.) For emergent cases, all pharmacologic and non-pharmacologic strategies, including protective stabilization, must be considered.

Advanced pharmacologic management is a reasonable option when a child's behavior or ability to cooperate interferes with safe conventional treatment. It should be underscored that procedural sedation outcomes are based on child temperament, medication regimens, physiology, and operator experience; thus, they are highly variable.² If caregivers choose procedural sedation, the clinician must have an open discussion about its inherent risks. The primary goal for the clinician is to provide safe and compassionate care that sets the child on a trajectory for excellent oral health over a lifetime.

Chronic disease management. Our decision-tree illustrates restorative care using chronic disease management (CDM) within a dental home, a concept that embraces a comprehensive plan that may include alternatives such as advanced behavior management, non-surgical caries management, and treatment deferral.⁴

Edelstein and Ng described CDM for ECC as the promotion of self-care through a combination of self, family, and community level strategies.⁵ The clinician's role is to identify the etiology of the disease, educate the caregiver (and child when sufficiently old enough to comprehend) to promote behavior change, and provide restorative dental care as needed.

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Most often this involves individualized case management; the clinical intervention may also include chemotherapeutic, non-surgical care to control the disease before providing traditional restorative/surgical care to restore form, function, and esthetics.⁵ This paradigm typically includes silver diamine fluoride and fluoride varnish applications, glass ionomer restorations (ATR/ITR), and more frequent recalls.

CDM itself is not considered a dental treatment but a framework under which the clinician can better manage children with dental disease. Although data are limited on the efficacy of CDM, preliminary findings are promising, suggesting that CDM leads to less onset of new cavitation and pain, fewer GA referrals, and improved overall outcomes.⁶ If disease cannot be controlled, CDM can still be useful for buying time for the child to reach an age and developmental status to cooperate for conventional in-office treatment. In some cases, sedation or GA may be necessary, but in all instances the CDM framework calls upon the clinician and the family to maintain an active role in addressing disease etiology.

Using the algorithm. The figure outlines an algorithm with questions to guide clinicians when counseling families about available behavior and disease management strategies. With the emergence of CDM as a contemporary management framework,⁵ it may be safer and, thus, in the child's best interest to pursue a risk-averse first-line approach using non-surgical techniques. As a framework, CDM does not mitigate against advanced techniques for definitive care; indeed, with progressive disease or failed approaches, more aggressive strategies may ultimately be indicated. If GA is indicated, the AAPD offers guidance under scenarios involving in-office, ambulatory surgical centers, or hospital operating rooms and urges extreme caution for children younger than two years old.⁷ When the dentition and disease have been addressed, the child should continue to be managed under the CDM framework.

The algorithm can be tailored to a particular child's developmental and behavioral status. Choosing one path does not lock a child into a particular endpoint; rather, the algorithm applies to each clinical encounter wherein a new restorative or surgical need is identified. In this way, the provider acknowledges that a child's developmental status/behavior often changes with time. At any point when a child reaches an appropriate developmental stage, the clinician can rely on conventional, in-office treatment in lieu of the advanced pharmacologic techniques presented in the algorithm.

The goal for any dental procedure should be to guard the patient's safety and welfare.² It is incumbent upon the clinician to take detailed medical, dental, family, and social histories and to make a thorough clinical assessment of the child's developmental, medical, and dental status to inform subsequent care recommendations.

Important information gathered during the clinical encounter

Age. A child's global developmental status is a critical component for any behavior management technique's success, and development-for-age is one way to measure this. The astute clinician tailors a behavior guidance plan to the developmental stage appropriate for a child's age and modifies those strategies based on the child's manifest behavior. Likewise, for pharmacologic management, age is a key characteristic but for different reasons. In December 2016, and reaffirmed in April 2017, the U.S. Food and Drug Administration issued a black box warning on the use of sedative agents and general anesthetics for children younger than three years old for more procedures of longer than three hours or repeated use of anesthetics; this warning was issued based on concerns about

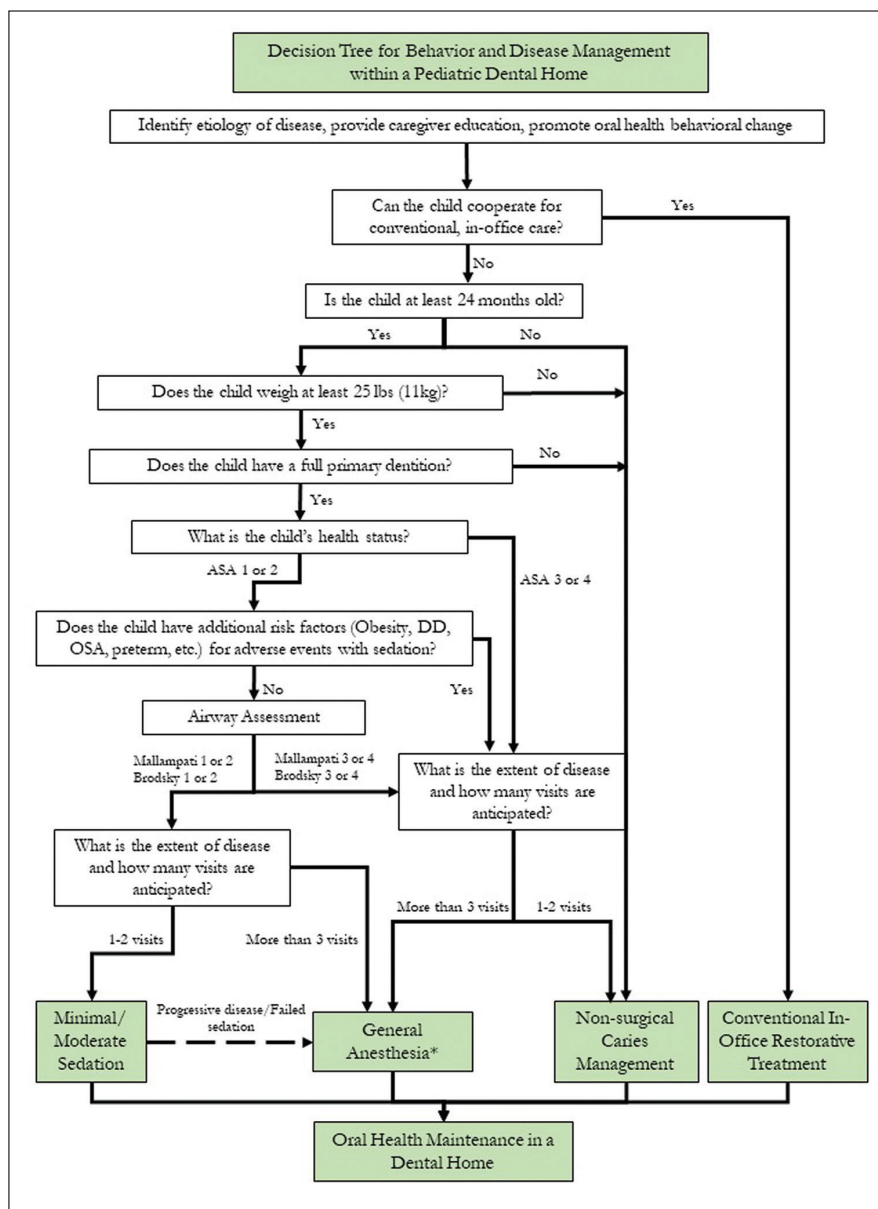


Figure. This algorithm outlines a framework for selecting a behavior and disease management plan in young children in non-emergent situations. The algorithm should begin anew: 1) at each clinical encounter new restorative/surgical needs are noted; and 2) if the disease is progressive or the originally selected management option fails. *GA in children less than 24 months should be completed in a hospital-based setting.

potential lasting neurotoxicity that “may affect the development of children’s brains.”⁸ This phenomenon has been a subject of concern to the public; therefore, dentists should be prepared to have this discussion with families of young children. At the same time, risk-averse moderate sedation protocols for dental procedures recommend against sedation and in-office GA prior to two years of age.⁷

Weight. Weight is an important consideration for children, because most applicable medications are dosed by weight. For moderate sedation, it is not uncommon to recommend against sedation for children weighing less than 25 pounds (11 kilograms) due to concerns about child safety and risk of adverse events.^{9,10} Body composition (i.e., obesity) can influence the accuracy of drug-dosing.¹¹ While hydrophilic agents act similarly in normal and obese children, lipophilic agents have longer elimination half-lives via redistribution to adipose tissue.^{1,12} Moreover, overweight and obese children are at greater risk for obstructive sleep apnea (OSA) and may experience more adverse events during procedural sedation.¹² Prolonged elimination of lipophilic agents poses additional risks for adverse events and must be carefully discussed with families during the informed consent process.

Medical status considerations and additional risk factors for sedation modalities. The American Society of Anesthesiologist’s (ASA) classification system is often used to assess a child’s overall health status and predict how well a child may tolerate general anesthesia.¹³ The AAPD sedation guidelines suggest that children who are ASA class I or II are appropriate candidates for procedural sedation.² Children who are ASA III or IV are at increased risk for adverse events and should only be considered in consultation with additional specialists.² Even for children classified as ASA I or II, those with developmental disability, preterm infants, and OSA have been shown to experience significantly more incidents of airway obstruction and desaturation during sedation.¹⁴⁻¹⁶ For children at increased risk of adverse events, a consultation with the child’s physician is encouraged to obtain a second opinion on the child’s suitability to tolerate sedation, highlight the gravity of the decision to use pharmacologic management, and document any additional medical management precautions.

Airway assessment. It is easy to overlook the airway during a dental examination, particularly for an uncooperative child, but such an assessment is a key preoperative evaluation. Airway obstructions are among the most common adverse events of sedation procedures.¹² Suitable pediatric dental sedation candidates’ airways should have minimal obstruction to minimize the risk of losing their protective airway reflex while sedated. Several assessment tools are available, but the Mallampati (visible distance between base of tongue and soft palate) and Brodsky (visible distance between the tonsils used to describe tonsillar enlargement) classification systems are frequently taught in pediatric dental residency training programs.⁹ Neither are intended as sedation suitability scales but rather as assessment tools to describe a child’s airway. Pediatric sedation candidates should clearly display the posterior pharynx with a minimally obstructed view by the tonsils. This would correspond to a Mallampati score of one or two, or a Brodsky score of zero, one-plus, or two-plus. Mallampati scores of three or four or Brodsky scores of three-plus or four-plus represent significantly obstructed airways and would pose additional risk during procedural sedation.¹⁷

Social and family determinants. It should be noted that social determinants, such as the number of guardians, mode of

transportation (e.g., public transportation), and caregiver health literacy, may impact recovery outcomes. Clinicians should be mindful of social and family histories. In some cases, family preferences may override the algorithm, and family compliance may influence the treatment recommendations. In such cases, clinicians who are uncomfortable with family preferences should encourage a second opinion.

Oral assessment. New disease management guidelines¹⁸ and evidence that children treated with pharmacologic management often require retreatment¹⁹ suggests the consent process should communicate that restorative treatment is not curative and often fails to arrest disease. It is likewise important that the clinician makes a global assessment of the teeth, disease activity, and restorative needs present. For young children who have not yet erupted their second primary molars, behavior management options may be limited. Traditionally, such children are often treated with GA, and the number of retreatments under GA is increasing.^{20,21} Because reasonable alternatives to immediate restorative or surgical treatment are available, the risks of pharmacologic management may outweigh the benefits; accordingly, non-surgical techniques or deferral should be strongly considered for children with an incomplete primary dentition in non-emergent situations.^{6,20}

Extent of dental disease. The severity of dental disease and proposed treatment can greatly influence the behavior and disease management recommendations. For children with minimal restorative needs (no more than one visit), non-surgical treatment under the CDM framework should be an initial consideration when conventional restorative care is not possible for behavioral reasons. Moderate sedation may also be a reasonable option if the child is a suitable candidate. If disease is severe and extensive, involving all quadrants and anterior sextants, GA is likely to be the best and most compassionate option. Generally, dental treatment under GA is more cost-effective when more than three visits are anticipated.²² Costs should never be the sole factor for a treatment recommendation, but they may strongly influence what caregivers ultimately embrace for their child.

Summary

All behavior and disease management recommendations must be made within the appropriate context of that child’s current oral health status. Moderate sedation and general anesthesia will continue to be high-quality, safe, and compassionate modes of dental care for children.²³ GA typically is reserved for children with the most challenging medical and dental needs, while sedation is reserved for the highly anxious child with minimal to moderate needs. We recommend that clinicians first consider a chronic disease management framework for all children with dental disease. For children who cannot be sedated safely and whose caregivers are reluctant to pursue pharmacologic management alternatives, non-surgical management strategies may provide reasonable alternatives to traditional restorative care.

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