An Algorithm for Managing Emergent Dental Conditions for Children

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The amount of emergency department dental utilization and related trend analysis data in peer-reviewed literature has increased; yet, little has been written on the actual management of dental emergencies. Often pre-existing medical conditions complicate what might otherwise be a straightforward dental emergency, challenging office-based dentists to manage dental emergencies in a safe manner. With the profession taking a stance on child safety, algorithms and checklists are becoming more important and common in healthcare during complicated scenarios. Additionally, more children are living longer with chronic medical conditions. This manuscript offers an algorithm that can guide clinicians through challenges presented during a dental emergency in children.

Keywords*: Emergency Treatment, Clinical Decision Making, Pediatric Dentistry*

INTRODUCTION

Urgent and emergency dental care for children presents many challenges for the dental team. Managing a child's behavior is much more difficult in the presence of infection or a dental emergency, especially if superimposed on a pre-existing medical condition.

Although emergency dental care has received considerable attention in the literature,[1,2] most published research is related to databases of third-party claims and inappropriate reliance on emergency departments for dental treatment. Such analyses are informative but not instructive for assessing the practical event that is the dental emergency. As one example, the National Emergency Department Sample is a nationally representative database providing highly sophisticated trend analyses in emergency dental care in hospital emergency departments;[2] however, beyond diagnostic and procedure billing codes, the database does not describe the context of the emergency nor how co-existing medical issues were managed—factors that are more meaningful for clinicians.

In a previous manuscript we presented an algorithm emphasizing non-emergent disease and behavior management.[3] Here, we propose a complementary decision-making algorithm to help guide clinicians when managing dental emergencies in children with coexisting complex medical conditions.

What is a Dental Emergency?

To paraphrase the lexicon of the emergency medicine specialty, a dental emergency is any unforeseen change in a child's oral health status, often interfering with daily physiologic or behavioral function, and requiring time-sensitive treatment.[4] It is important to differentiate a true dental emergency from a simple deviation from normal. A caregiver might describe this change as a new and perhaps acute deviation from the child's baseline dental or oral health status. A hyper-vigilant caregiver's concern about a newly erupting tooth or another benign finding may require only reassurance and anticipatory guidance. However, it is essential to be mindful that caregivers' anxiety related to their children's health can be anxiety-provoking, creating a sense of situational urgency much higher than that of the dental team's. Accordingly, empathy with caregivers should be a high priority. That being said, from a clinician's viewpoint, management of what some might term a "social emergency" is often simple and easily accomplished within normal office readiness.

This manuscript focuses on a handful of conditions that would qualify as life-threatening dental emergencies:

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- A facial swelling that 1) compromises the airway or threatens a possible cavernous sinus abscess by a pathway to the brain, 2) includes periorbital inflammation that can lead to pressure necrosis of the optic nerve/optic tracts, or 3) a fever exceeding **39 C (102 F)** predisposing to sepsis[5]
- Uncontrolled hemorrhage
- Unremitting oral pain or idiopathic orofacial pain
- A dislodged intraoral-appliance impeding the airway
- An avulsed permanent tooth in the presence of an acute medical condition.

These emergency scenarios require immediate attention. A delay in treatment can have serious health consequences and limit future treatment options, especially in the case of permanent tooth avulsion. In the cases noted above, the child should be seen immediately, triaged for both dental and medical urgency, managed for medical concerns, and then treated for dental issues once stabilized.

Potential medical complications associated with a dental emergency pose particular challenges because the child's medical status—either acute or chronic—may greatly influence how, where, and when dental treatment can be provided safely. Medical-related conditions that represent true emergencies include:

- Loss of consciousness (LOC) anytime following trauma
- Imbedded projectiles in the head and neck region
- Uncontrolled systemic disease or an acute exacerbation of chronic disease during the dental emergency (for example: immunodeficiency, chronic corticosteroid therapy, or uncontrolled diabetes, epilepsy, and asthma)
- Hemodynamic instability (for example: dehydration, sickle cell anemia, or hemophilia)
- Erratic and potentially unusual behavior

The presence of any such complicating factors poses a management dilemma. The argument can be made that dentists are ideally trained to treat the dental problem but in some instances, an acute or superimposed medical condition can potentially endanger the patient if not managed systematically with the appropriate medical consultation prior to initiating dental treatment.

The Genesis of the Algorithm

Based on expert opinion and current literature describing patient safety and the dental management of children with chronic conditions, this algorithm offers a decision-making framework for managing pediatric dental emergencies. A systematic approach to emergency triage and pre-procedure assessment is essential. Health reform and recent highly publicized adverse events underscore the policy focus on patient safety,[6] an evolving discipline whose primary goal is to "facilitate the avoidance of preventable adverse events".[7] Provider, patient, and health systems factors and their economic, social, and cultural influences contribute to adverse events in dental care.[7,8] Among the most common such events are misdiagnosis, delayed care or referral, disease progression, or systemic complications.[9] Many events are avoidable during the pre-procedure period with careful assessments and consultations, or by following a prescribed pre-operative checklist with attention to the child's medical history and current status.[10,11] The presence of pain, infection, or stress can exacerbate an underlying medical condition,[12,13] emphasizing the importance of due diligence during triage and pre-procedural assessments.

Pediatric Advanced Life Support (PALS) training from the American Heart Association provides an analogous approach to our algorithm.[14] In that training, when vital aspects of life support go awry, clinicians in the emergency setting are encouraged to review medical history as well as event-related aspects of the patient's presentation to identify potential explanations such as poisoning, diabetic complications, and trauma for loss of breathing, airway, or circulation. The identification of these systemic elements and their contribution to the medical emergency can facilitate patient rescue. In our algorithm, rapid evaluation of medical issues and their subsequent management can facilitate treatment of the dental emergency.

A third element of this algorithm is behavior guidance. When dental treatment is possible in the presence of a medical issue, most traditional and advanced behavior management techniques are reasonable options, but the decision on which behavior technique to rely upon should take into consideration the child's current medical, dental, behavioral, and family/social condition, as typically is the case in non-emergent situations. The primary management and treatment goal should be to provide safe and compassionate care that addresses the emergency and if possible, the associated dental problem.

Using the algorithm

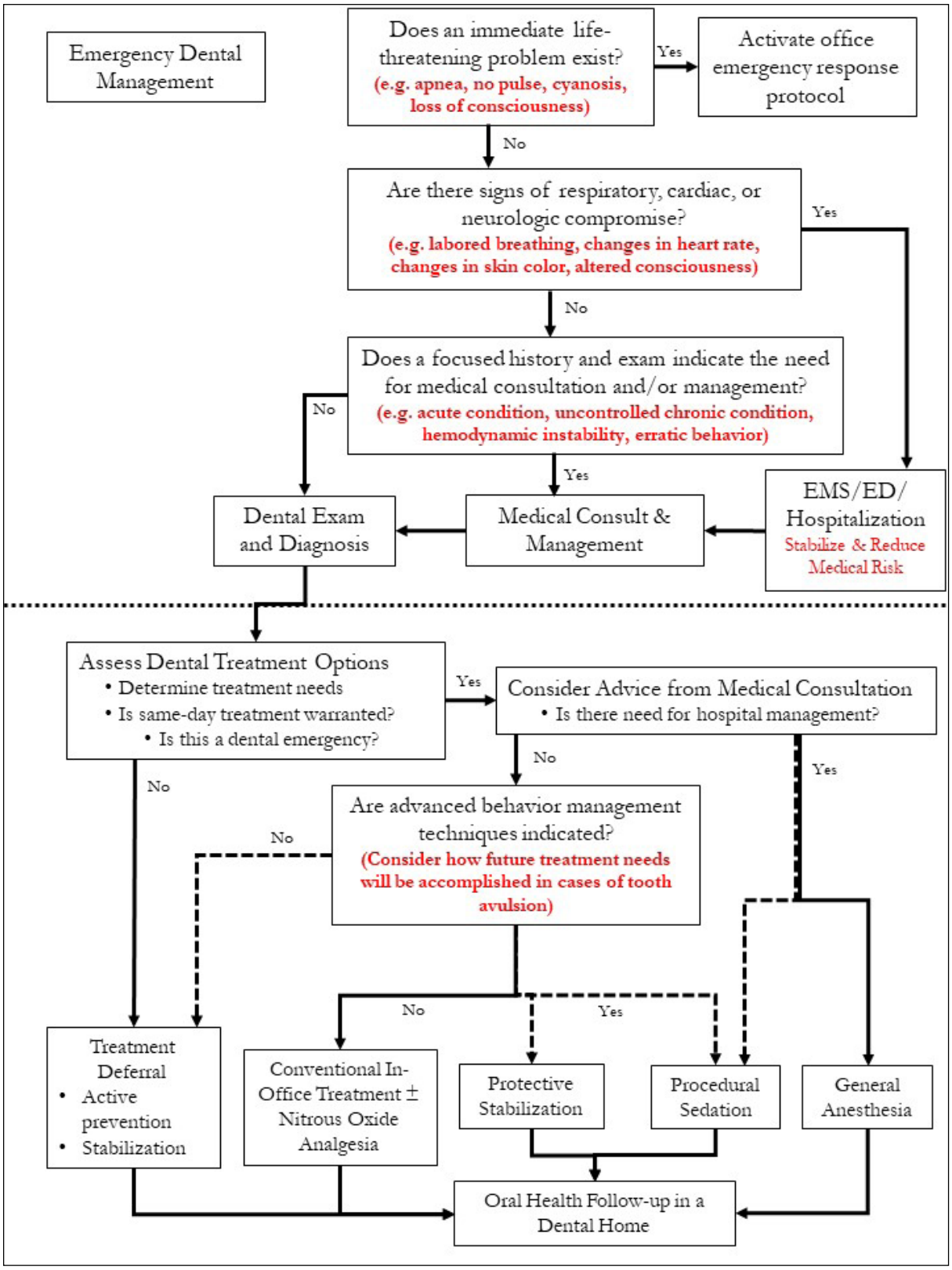
The top-half of Figure 1 emphasizes the importance of medical triage and risk management, while the bottom-half examines dental treatment options. The goal for any dental procedure should be "to guard the patient's safety and welfare".[15] Key to the clinician's decisions are medical, dental, family, and social histories combined with a thorough clinical assessment of the child's present condition. Advanced life support training emphasizes targeted and continuous evaluation, identification, and intervention as necessary during medical emergencies; the same applies to managing dental emergencies.

The systematic approach begins by determining if an immediate life-threatening problem exists (e.g. apnea, respiratory distress, cyanosis, altered consciousness, uncontrollable bleeding). If so, it is essential to activate the office or clinic emergency-response protocol. If no immediate life-threatening problem exists, the focused evaluation continues. Many assessment tools exist, but the SAMPLE acronym has been recommended for obtaining a quick, yet relevant history: Signs/symptoms, Allergies, Medications, Past medical history, Last dietary intake, and Events leading to the emergency.[14] Significant positive responses require management or consultation before any dental treatment.

Community resources including nearby dental and medical specialists, provider experience and training, and access to medical facilities can greatly influence where, when, and how treatment will be completed. For example, it may be relatively easy for a clinician with privileges at a nearby medical center to obtain consultation and medical assistance while a clinician in a rural setting may not have the same resources available. When resources are limited and a medical consultation is necessary, the dentist can stabilize the dental condition using interim (e.g. localized hemorrhage control, ART,

SDF) and symptomatic therapy (e.g. antibiotics, analgesics) until the child is medically stable. More widespread use of teledentistry in these situations may improve outcomes and is an area needing further study.

Figure 1. An algorithm for managing pediatric dental emergencies. Dashed lines indicate resource and child dependence. The management techniques must be accessible and the child must be a suitable candidate. GA in children under 24 months should be completed in a hospital.



A Word on Protective Stabilization

The AAPD and the Joint Commission provide rigorous guidelines for protective stabilization.[16,17] The primary use is if behavior precludes timely, or immediate, diagnosis and treatment when indicated. A child's current condition (medical, family, and social history) may dictate that protective stabilization is a prudent alternative for managing the emergent need before continuing care within the dental office as described in our previous algorithm.[3] Protective stabilization may be used for certain subgroups of children who may benefit from the gentle pressure provided by the device to ease anxiety for routine care.[16] These indications and recommendations from professional organizations inform office policy development on the use of restraint, or protective stabilization. A discussion of masking physiologic responses related to medical conditions by restraint devices is beyond the scope of this paper but needs to be considered when using protective stabilization in the context of this current algorithm.

Scenarios

For this manuscript, two scenarios are presented to demonstrate the application of algorithm.

Scenario #1 (Figure 2, blue highlights)

The initial assessment should focus on life-threatening airway, cardiac, neurologic, or traumatic conditions. In this first scenario, the findings are not life threatening but based on the size and location of the swelling, a prudent clinician would suspect Ludwig's angina, which can precipitate a life-threatening risk to airway stability in children. While respiratory infections are the predominant etiologic agent for Ludwig's in children, odontogenic infections have also been implicated.[18] A suspected diagnosis of Ludwig's should prompt a referral to the nearest hospital's emergency department for intravenous antibiotics, airway observation, and anesthesia consultation for surgical resolution if the child's condition is unresponsive to antibiotics.[18]

The dentist, family, and consulting physicians must also decide how to complete definitive care to eliminate the source of infection. In this case, a limited clinical examination was completed using protective stabilization (with consent), revealing an extensive carious lesion on tooth #36 (American system tooth #19, a lower permanent first molar). A diagnostic radiograph could not be obtained. The differential diagnoses include suspected pulpal necrosis and the preferred treatment option is extraction. Same day or next day treatment at the hospital would be indicated if the child requires surgical resolution of the medical condition. The referring clinician could coordinate with the emergency department and surgical team (either the referring clinician or an oral surgeon depending on resources) for extraction in conjunction with a drainage procedure if needed.

If the child responds to antibiotic therapy and the swelling resolves, so too does the urgency. The dental treatment needs remain the same and the past dental history including protective stabilization and general anesthesia suggests that advanced behavior management techniques are indicated. The child's recent history and general behavior may preclude procedural sedation. Protective stabilization could be used if no other dental treatment needs are identified; however, general anesthesia may be the most compassionate option to complete a comprehensive examination and additional treatments.

Scenario #2 (Figure 2, green highlights)

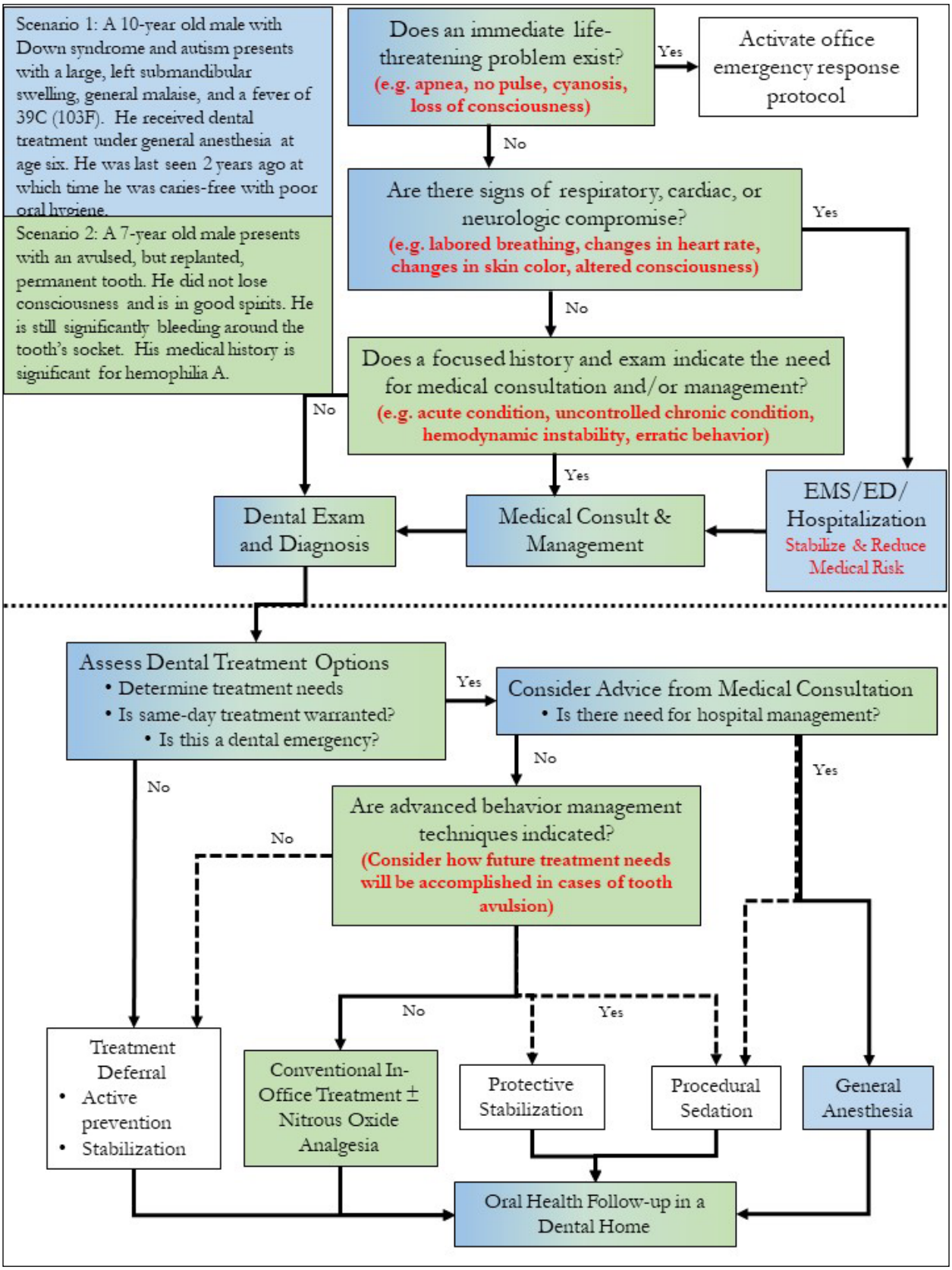
Uncontrolled bleeding, particularly in a child with severe hemophilia, can precipitate a life-threatening condition. Children with severe hemophilia are more prone to spontaneous bleeding.[19] Tooth avulsion is unlikely to cause severe uncontrollable bleeding. The targeted SAMPLE review suggests a medical consultation is indicated. The child's hematologist can provide management recommendations (e.g. systemic versus local measures) based on the severity and control of the child's condition.

Dental treatment for an avulsion is replantation and splinting as soon as possible to optimize the prognosis, and established protocols exist to guide trauma management.[20] In a cooperative child, this may be accomplished in the dental office dependent upon the hematologist's recommendations. The treatment decision is more complex when the child is uncooperative. The clinician and caregiver must weigh the risks of multiple pharmacologic interventions versus the benefits of saving the tooth. Procedural sedation may be an option if the child meets the pre-procedural assessment criteria necessary according to the AAPD guidelines.[15]

CONCLUSION

The aim of this manuscript was to propose a decision-making algorithm to guide clinicians in managing dental emergencies in children with co-existent medical conditions. We offered an operational definition of a dental emergency and relied upon two extreme scenarios to illustrate the algorithm's application, while underscoring that family, social, and community access issues can influence time-sensitive clinical decisions.

Figure 2. Two scenarios are used to demonstrate the application of the algorithm.



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