American Academy of Pediatric Dentistry
63rd Annual Session
Hilton Hotel and Towers
Chicago, Illinois

Reference Committee Hearing Materials

Saturday, May 29, 2010
10:00 – 11:00 a.m.
Marquette

Council on Clinical Affairs

NOTICE TO ACTIVE AND LIFE MEMBERS

(1) REFERENCE COMMITTEE HEARINGS AND REPORTS & (2) GENERAL ASSEMBLY MEETING

Oral health policies and clinical guidelines of the American Academy of Pediatric Dentistry will be the subject matter for the Reference Committee hearings at the Annual Session. Recommendations from the Council on Clinical Affairs concerning oral health policies and clinical guidelines were available under "Latest News" in the Members-Only section of the AAPD web site (www.aapd.org) for the past month. They are reprinted here for your convenience.

The Reference Committee hearings will take place on Saturday, May 29, 2010 from 10:00 to 11:00 a.m. in the Marquette Room of the Hilton Hotel and Towers. Members are strongly encouraged to attend. Non-members may attend, but will be polled and asked to identify themselves by the chair, and are not allowed to comment. The Reference Committees are intended to be the venue for member discussion on any formal resolutions that will be proposed before the General Assembly. This is an opportunity for members to present testimony on proposed oral health policies and clinical guidelines, and other business to come before the General Assembly.

The General Assembly and Awards Recognition will take place on Sunday, May 30, 2010 from 9:00 a.m. to 11:00 a.m. in the Grand Ballroom of the Hilton Hotel and Towers. The General Assembly is a meeting of Active and Life members for the purposes of conducting the business of the AAPD. Final action on recommendations from Reference Committees takes place at the General Assembly.

Reference Committee Reports will be available in the back of **the Grand Ballroom** of the Hilton Hotel and Towers beginning at 8:00 a.m. on Sunday morning May 30,2010 prior to the beginning of the General Assembly at 9:00 a.m. If available in time, copies will also be provided at District Caucuses on Saturday, May 24, 2010 from 1:00 to 2:00 p.m.

2009-2010 Report of the Council on Clinical Affairs

Joseph B. Castellano, Chair
Robert L. Delarosa, Board Liaison
John Rutkauskas and Mary Essling, Staff Liaisons

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Anupama R. Tate (II)
Larry D. Dormois (III)
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Randall K. Lout (VI)

Consultants and Ex-Officio members:
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Elizabeth S. Barr, Consultant
Richard S. Chaet, Consultant
Noel K. Childers, Consultant
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Sara L. Filstrup, Consultant
Carolyn Kerins, Consultant
Brian J. Sanders, Consultant
Issa Sasa, Consultant
Jenny Ison Stigers, Consultant
Norman Tinanoff, Consultant
Marcio A. da Fonseca, Expert Consultant
Brian S. Martin, Expert Consultant
Deborah Studen-Pavlovich, Expert Consultant and Ex-Officio (Chair, Committee on the Adolescent)

Charge 1. Status of Charge 1: In Progress

Review all definitions, oral health policies and clinical guidelines at no greater interval than every fifth year. Engage the Council on Scientific Affairs to perform a literature review for scientific validity.

Background and Intent: This is a standing charge to the Council. To be effective advocates for infants, children, adolescents, and persons with special health care needs, AAPD oral health policies and clinical guidelines must be supported by the best available evidence. Documents will be reviewed and revised/reaffirmed/retired in a cycle of not more than 5 year intervals. When there is sufficient reason (e.g., publications from a consensus conference), documents will be evaluated in advance of their scheduled review cycle.

Review the following in 2009-2010:

a) Definition of the Dental Home
b) Policy on the Dental Home
c) Guideline on Adolescent Oral Health Care
d) Guideline on Pediatric Oral Surgery
e) Guideline on Oral/Dental Aspects of Abuse
f) Policy on Hospitalization and OR Access for Dental Care
g) Policy on Hospital Staff Membership
h) Guideline on Management of Acute Dental Trauma
i) Definition of Dental Neglect
j) Guideline on Acquired TMD in Infants, Children, Adolescents
k) Policy on Xylitol
l) Policy on Prevention of Sports-related Injuries

m) Policy on Tobacco Use
n) Policy on Use of a Caries-risk Assessment Tool (CAT) for Infants, Children, and Adolescents

Progress Report for Charge 1

All documents were reviewed by the Council on Clinical Affairs and the Council on Scientific Affairs. If necessary, modifications and/or revisions were made. The final documents are attached for approval.

CCA recommends the "Policy on Use of a Caries-Risk Assessment Tool for Infants, Children, and Adolescents" be changed to a more comprehensive "Guideline on Caries Risk Assessment and Management". The document is attached for review and approval.

Charge 2. Status of Charge 2: Completed

Annually review all AAPD-endorsed policies and guidelines developed by other healthcare organizations.

Background and Intent: This is a standing charge to the Council to promote optimal standards of care. CCA annually will monitor the policies and guidelines of other dental and medical healthcare organizations to determine when revisions have been made by the authoring group and the appropriateness of AAPD's continued endorsement.

Progress Report for Charge 2

CCA has reviewed these documents and recommends continued endorsement.

Charge 3. Status of Charge 3: Ongoing

Annually review the tables, charts, graphs and other items found in the resource section of the Reference Manual.

Background and Intent: This is a standing charge to the Council to provide contemporary guidance in clinical practice. CCA will maintain a resource section within the Reference Manual that supplements AAPD oral health policies and clinical guidelines. An annual review will determine the accuracy of information and appropriateness for continued inclusion.

Progress Report for Charge 3

All tables, charts and graphs, and other items were reviewed by CCA.

CCA recommends that the "Decision Tree for Avulsed Teeth" be deleted and replaced with the new "Open Apex Decision Tree" and the "Closed Apex Decision Tree". These documents are attached for review and approval.

CCA recommends the placement of the "Sample Letter for School Absences for Dental Appointments" to be placed in the resource section of the reference manual. The document is attached for review and approval.

Charge 4. Status of Charge 4: Completed

Identify potential topics for new definitions, oral health policies, clinical guidelines, and items for the resource section. Present a list of potential topics and recommendations to the Board of Trustees annually.

Background and Intent: This is a standing charge to the Council to anticipate and respond effectively to changes in the clinical and scientific environment.

Progress Report for Charge 4

CCA has recommended to the BOT that the following topics be considered for new policies and guidelines.

a) Policy on Oral Health in Child Care Centers
b) Policy on Transitioning of Adult Special Health Care Needs Patients
c) Guideline on Xylitol

Charge 5. Status of Charge 5: In Progress

Develop definitions, policies, guidelines or other materials as requested by the Board of Trustees.

Background and Intent: This is a standing charge to the Council. To be effective advocates for infants, children, adolescents, and persons with special health care needs, AAPD must delineate the organization's position on new and emerging health issues and translate science into clinical practice.

Develop the following in 2009-2010:

a) Policy on Second Opinion
b) Policy on School Absences for Dental Appointments
c) Sample Letter for School Absences for Dental Appointments

Background and Intent: Some school principals and some school attendants refused to allow students to be excused from school to attend dental appointments. The intent is to develop a communication device an AAPD member could send to school to stress the importance of dental visits during school hours and allow the students to be excused from school.

Progress Report for Charge 5

All listed documents were developed by the Council on Clinical Affairs and reviewed by the Council on Clinical Affairs and the Council on Scientific Affairs. They are attached for review and approval.

Charge 6. Status of Charge 6: Completed

At the request of the Committee on Communications, review proposed pamphlets, brochures and other AAPD publications for scientific accuracy and consistency with AAPD Policies and Guidelines.

Background and Intent: This is a standing charge to the Council to ensure that the publications and promotional and educational materials offered to our members, other professionals, and the public are scientifically accurate and consistent with our Policies and Guidelines.

Progress Report for Charge 6

There have been no pamphlets, brochures, or other AAPD publications forwarded to CCA this year.

Charge 7. Status of Charge 7: Completed

At the request of the Executive Committee of the AAPD, provide timely review of policies, guidelines, and definitions submitted by the AAP Section on Pediatric Dentistry and Oral Health, with particular attention to conformity with AAPD oral health policies and clinical guidelines.
Background and Intent: This is a standing charge to the Council. This mechanism implements the intent of the Memorandum of Understanding with the AAP Section on Pediatric Dentistry and Oral Health, to review proposed documents for consistency with AAPD policies and guidelines. The Council will review these documents with sensitivity to the embargoed status of the drafts. A summary report will be submitted to the Executive Committee.

Progress Report for Charge 7

There were no policies, guidelines, definitions or other material forwarded to CCA this year.

Additional Comments

I would like to commend this council for their hard work and timeliness in the reviewing, modifying, and revising of all the documents. They have done an exceptional job this year, met each and every deadline with no delays, and are ready for next year's challenges.

I would like to give a special thanks to Margaret Bjerklie for all her administrative support to CCA over the year. She is truly a diamond in the AAPD's crown.

Lastly, thanks to the Board of Trustees. Their direction and support has allowed CCA to continually expand and improve our reference manual.

Definition of Dental Home

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2006

Reaffirmed
2010

The dental home is the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way. Establishment of a dental home begins no later than 12 months of age and includes referral to dental specialists when appropriate.

Policy on the Dental Home

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2001

Revised
2004

Reaffirmed
2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) supports the concept of a dental home for all infants, children, adolescents, and persons with special health care needs. The dental home is inclusive of all aspects of oral health that result from the interaction of the patient, parents, nondental professionals, and dental professionals. Establishment of the dental home is initiated by the identification and interaction of these individuals, resulting in a heightened awareness of all issues impacting the patient's oral health. This concept is derived from the American Academy of Pediatrics' (AAP) definition of a medical home which states pediatric primary health care is best delivered where comprehensive, continuously accessible, family-centered, coordinated, compassionate, and culturally-effective care is available and delivered or supervised by qualified child health specialists.[1-4]

Methods

This policy is based on a review of the current dental and medical literature related to the establishment of a dental home. A MEDLINE search was conducted using the terms "dental home", "medical home in pediatrics", and "infant oral health care". Expert opinions and best current practices were relied upon when clinical evidence was not available.

Background

The AAP issued a policy statement defining the medical home in 1992.[5] Since that time, it has been shown that health care provided to patients in a medical home environment is more effective and less costly in comparison to emergency care facilities or hospitals.[4-6] Strong clinical evidence exists for the efficacy of early professional dental care complemented with caries-risk assessment, anticipatory guidance, and periodic supervision. The establishment of a dental home may follow the medical home model as a cost-effective and higher quality health care alternative to emergency care situations.

Children who have a dental home are more likely to receive appropriate preventive and routine oral health care. Referral by the primary care physician or health provider has been recommended, based on risk assessment, as early as 6 months of age, 6 months after the first tooth erupts, and no later than 12 months of age.[7-9] Furthermore, subsequent periodicity of reappointment is based upon risk assessment. This provides time-critical opportunities to implement preventive health practices and reduce the child's risk of preventable dental/oral disease.[10]

Policy statement

1. The AAPD encourages parents and other care provi-ders to help every child establish a dental home by 12 months of age.
2. The AAPD recognizes a dental home should provide:[11]
   a. comprehensive oral health care including acute care and preventive services in accordance with AAPD periodicity schedules[12];
   b. comprehensive assessment for oral diseases and conditions;
   c. individualized preventive dental health program based upon a caries-risk assessment[13] and a periodontal disease risk assessment[14];
   d. anticipatory guidance about growth and development issues (ie, teething, digit or pacifier habits);
   e. plan for acute dental trauma;

f. information about proper care of the child's teeth and gingivae. This would include the prevention, diagnosis, and treatment of disease of the supporting and surrounding tissues and the maintenance of health, function, and esthetics of those structures and tissues;

g. dietary counseling;

h. referrals to dental specialists when care cannot directly be provided within the dental home;

i. education regarding future referral to a dentist knowledgeable and comfortable with adult oral health issues for continuing oral health care; referral at an age determined by patient, parent, and pediatric dentist.

3. The AAPD advocates interaction with early intervention programs, schools, early childhood education and child care programs, members of the medical and dental communities, and other public and private community agencies to ensure awareness of age-specific oral health issues.

References

1. American Academy of Pediatrics Committee on Children with Disabilities. Care coordination: Integrating health and related systems of care for children with special health care needs. Pediatrics 1999;104(4Pt1):978-81.
2. American Academy of Pediatrics. Committee on Pediatric Workforce. Culturally effective pediatric care: Education and training issues. Pediatrics 1999;103(1):167-70.
3. American Academy of Pediatrics Committee on Pediatric Workforce. Pediatric primary health care. AAP News November 1993;11:7. Reaffirmed June 2001.
4. American Academy of Pediatrics. The medical home. Pediatrics 2002;110(1Pt1):184-6.
5. American Academy of Pediatrics Ad Hoc Task Force on the Definition of the Medical Home. The medical home. Pediatrics 1992;90(5):774.
6. Kempe A, Beaty B, Englund BP, Roark RJ, Hester N, Steiner JF. Quality of care and use of the medical home in a state-funded capitated primary care plan for low-income children. Pediatrics 2000;105(5):1020-8.
7. Nowak AJ, Casamassimo PS. The dental home: A primary oral health concept. J Am Dent Assoc 2002;133 (1):93-8.
8. Nowak AJ. Rationale for the timing of the first oral evaluation. Pediatr Dent 1997;19(1):8-11.
9. American Academy of Pediatrics Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. Pediatrics 2003;111(5):1113-6.
10. US Dept of Health and Human Services. Healthy People 2010: Understanding and improving health. 2nd ed. Washington, DC. US Government Printing Office; November 2000.

11. Poland C. Pediatric oral health. In: Burns CE, Brady MA, Dann AM, Starr N, eds. Pediatric Primary Care: A Handbook for Nurse Practitioners. 2nd ed. Philadelphia, Pa: WB Saunders Co; 2000.
12. American Academy of Pediatric Dentistry. Guideline on periodicity of examination, preventive dental services, antic-ipatory guidance, and oral treatment for children. Pediatr Dent 2004;26(suppl):81-3.
13. American Academy of Pediatric Dentistry. Policy on use of a caries-risk assessment tool (CAT) for infants, children, and adolescents. Pediatr Dent 2004;26(suppl):25-7.
14. American Academy of Periodontology. Periodontal diseases of children and adolescents. J Periodontol 2003;74(11):1696-704.

Guideline on Adolescent Oral Health Care

Originating Committee
Clinical Affairs Committee

Review Council
Council on Clinical Affairs, Committee on the Adolescent

Adopted
1986

Revised
1999, 2003, 2005, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that the adolescent patient has unique needs. This guideline addresses these unique needs and proposes general recommendations for their management.

Methods

This guideline is an update of the previous document, revised in 2005. The update includes an electronic search using the search terms, ~~based on a review of the current dental and medical literature related to adolescent oral health. A MEDLINE search was conducted using the term~~ "adolescent" combined with "dental", "gingivitis", "oral piercing", "sealants", "oral health", "caries", "tobacco use", "dental trauma", "orofacial trauma "periodontal", "dental esthetics", "smokeless tobacco", "nutrition", and "diet". Fields: All Fields; Limits: within the last ten years: humans; English; clinical trails. The reviewers agreed upon the inclusion of five thousand eight hundred seventy-four (5874) and four hand searched articles that met the defined criteria. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background

There is no standard definition of "adolescent". [1] Adolescents are defined very broadly as youths between the ages of 10 to 18. Using this definition, there were approximately ~~39.9~~

41.5 million adolescents in the United States in ~~2003~~ 2008, according to the US Census Bureau.[2] The adolescent patient is recognized as having distinctive needs[3, 4] due to: (1) a potentially high caries rate; (2) increased risk for traumatic injury and periodontal disease; (3) a tendency for poor nutritional habits; (4) an increased esthetic desire and awareness; (5) complexity of combined orthodontic and restorative care (e.g., congenitally missing teeth); (6) dental phobia; (7) potential use ~~initiation~~ of tobacco, alcohol and other drugs ~~use~~; (8) pregnancy; (9) eating disorders; and (10) unique social and psychological needs.[5-8]

Treatment of the adolescent patient can be multifaceted and complex. An accurate, comprehensive, and up-to-date medical history is necessary for correct diagnosis and effective treatment planning. Familiarity with the patient's medical history is essential to decreasing the risk of aggravating a medical condition while rendering dental care. If the parent is unable to provide adequate details regarding a patient's medical history, consultation with the medical health care provider may be indicated. The practitioner also may need to obtain additional information confidentially from an adolescent patient.

Recommendations

This guideline addresses some of the special needs within the adolescent population and proposes general recommendations for their management.

Caries

Adolescence marks a period of significant caries activity for many individuals. Current research suggests that the overall caries rate is declining, yet remains high~~est~~ during adolescence. [9] ~~These carious lesions often are confined to developmental pits and fissures.[10]~~

Immature permanent tooth enamel,~~11~~10 a total increase in susceptible tooth surfaces, and environmental factors such as diet, independence to seek care or avoid it, a low priority for oral hygiene, and additional social factors also may contribute to the upward slope of caries in adolescence. [1,12-14] It is important for the dental provider to emphasize the positive effects that fluoridation, routine professional care, patient education, and personal hygiene can have in counteracting the changing pattern of caries in the adolescent population. [5,6,11,15]

Management of Caries

Primary prevention

Fluoride: Fluoridation has proven to be the most economical and effective caries prevention measure. The adolescent can benefit from fluoride throughout the teenage years and into early adulthood. Although the systemic benefit of fluoride incorporation into developing enamel is not considered necessary past 16 years of age, ~~the~~ topical benefits ~~of remineralization and antimicrobial activity still~~ can be obtained through ~~water fluoridation,~~ optimally fluoridated water, professionally-applied and prescribed compounds, and fluoridated dentifrices.[16]

Recommendations: The adolescent should receive maximum fluoride benefit dependent on risk assessment: [17]

~~1. Systemic fluoride intake via optimal fluoridation of drinking water or professionally prescribed supplements is recommended to 16 years of age. or the eruption of the second permanent molars, whichever comes first.~~

~~2~~1. Brushing teeth twice a day with a ~~F~~ fluoridated dentifrice is recommended to provide continuing topical benefits ~~through adolescence~~.[11, 18]

~~3~~2. Professionally applied fluoride treatments should be based on the individual patient's caries-risk assessment, as determined by the patient's dental provider.[18]

~~4~~3. Home-applied prescription strength ~~T~~topical fluoride products ~~supplementation via home-applied compounds~~ (e.g., 0.4% stannous fluoride gel, 0.5% F gel or paste, or 0.2% NaF rinse) ~~should~~ may be ~~a professional recommendation~~ used when indicated by an individual's caries pattern or caries risk status.[18]

~~4~~4. Systemic fluoride intake via optimal fluoridation of drinking water or professionally prescribed supplements is recommended to 16 years of age. Supplements should only be given after all other sources of fluoride have been evaluated.[18]

5. The criteria for determination of need and the methods of delivery should be those currently recommended by the American Dental Association and the AAPD.[~~17~~ 18]

Oral hygiene: Adolescence can be a time of heightened caries activity and periodontal disease due to an increased intake of cariogenic substances and inattention to oral hygiene procedures. [1,~~18~~ 19] Tooth brushing with a fluoridated dentifrice and flossing can provide a~~n anticaries~~ benefit through ~~plaque removal from tooth surfaces and~~ the topical effect of the fluoride and plaque removal from tooth surfaces.[20]

Recommendations:

1. Adolescents should be educated and motivated to maintain personal oral hygiene through daily plaque removal, including flossing, with the frequency and pattern based on the individual's disease pattern and oral hygiene needs.[19, 20]
2. Professional removal of plaque and calculus is recommended highly for the adolescent, with the frequency of such intervention based on the individual's assessed risk for caries/periodontal disease, as determined by the patient's dental provider.[~~19~~ 20, 21]

Diet management: The role of carbohydrates in caries initiation is unequivocal. Adolescents are exposed to and consume high quantities of refined carbohydrates and acid-containing beverages.[12, 13, ~~20~~ 22] The adolescent can benefit from diet analysis and modification.

Recommendations: Diet analysis, along with professionally determined recommendations for maximal general and dental health, should be part of an adolescent's dental health management. [23] A diet analysis and management should consider:

1. dental disease patterns;
2. overall nutrient and energy needs;
3. psychosocial aspects of adolescent nutrition;
4. dietary carbohydrate intake and frequency;
5. intake and frequency of acid-containing beverages;
6. wellness considerations;

Sealants: Sealant placement is an effective caries-preventive technique that should be considered on an individual basis. Sealants have been recommended for any ~~adolescent~~ tooth, primary or permanent, that is judged to be at risk for pit and fissure caries.[6, 13,~~21-24~~ 24-27]

Caries risk may increase due to changes in patient habits, oral microflora, or physical condition, and unsealed teeth subsequently might benefit from sealant applications.[24,27]

Recommendations: Adolescents at risk for caries should have sealants placed. An individual's caries risk may change over time; periodic reassessment for sealant need is indicated throughout adolescence.[24,27]

Secondary prevention

Professional preventive care: Professional preventive dental care, on a routine basis, may prevent oral disease or disclose existing disease in its early stages. The adolescent patient whose oral health has not been monitored routinely by a dentist may have advanced caries, periodontal disease, or other oral involvement urgently in need of professional evaluation and extensive treatment.

Recommendations:

1. Timing of periodic oral examinations should take into consideration the individual's needs and risk indicators to determine the most cost-effective, disease-preventive benefit to the adolescent.[17]
2. Initial and periodic radiographic evaluation should be a part of a clinical evaluation. The type, number, and frequency of radiographs should be determined only after an oral examination and history taking. Previously exposed radiographs should be available, whenever possible, for comparison. Currently accepted guidelines for radiographic exposures (i.e., appropriate films based upon medical history, caries risk, history of periodontal disease, and growth and development assessments) should be followed.[25,28]

Restorative dentistry: In cases where remineralization of noncavitated, demineralized tooth surfaces is not successful, as demonstrated by progression of carious lesions, dental restorations are necessary. Preservation of tooth structure, esthetics, and each individual patient's needs must be considered when selecting a restorative material.[26,29] Molars with extensive caries or malformed, hypoplastic enamel—for which traditional amalgam or composite resin restorations are not feasible—may require full coverage restorations.[24, 27,27,30]

Recommendations: Each adolescent patient and restoration must be evaluated on an individual basis. Preservation of noncarious tooth structure is desirable. Referral ~~to an appropriately trained and/or experienced dentist~~ should be ~~considered~~ made when treatment needs are beyond the treating dentist's ~~ability or interest~~ scope of practice. [27]

Periodontal diseases

Adolescence can be a critical period in the human being's periodontal status. Epidemiologic and immunologic data suggest that irreversible tissue damage from periodontal disease begins in late adolescence and early adulthood.[8] ~~Pubertal changes characteristically affect the periodontium of the young adolescent, with an increase in inflammation, which is, in most cases, manageable through oral hygiene and regular professional care.[28]~~ Adolescents have a higher prevalence of gingivitis than prepubertal children or adults. The rise of sex hormones during adolescence is suspected to be ~~the~~ a cause of the increased prevalence. Studies suggest that the increase in sex hormones during puberty affects the composition of the subgingival microflora.[31] Other studies suggest circulating sex hormones may alter capillary permeability and increase fluid accumulation in the gingival tissues. This inflammatory gingivitis is believed to be transient as the body accommodates to the ongoing presence of the sex hormones.[32]

Acute conditions: The adolescent may be subjected to acute conditions such as acute necrotizing ulcerative gingivitis~~,~~ and periodontitis, ~~and traumatic injuries,~~ which can require immediate and occasional long-term management. In most cases, early diagnosis, treatment, and appropriate management can prevent irreversible damage.~~[29-31]~~[33-35]

Recommendations: Acute intraoral infection involving the periodontium and oral mucosa requires immediate treatment. Therapeutic management should be based on currently accepted techniques of periodontal therapy.[36, 37] ~~Traumatic injuries to the teeth and periodontium always require dental evaluation and treatment.[36]~~ Referral ~~to an appropriately trained and/or experienced dentist~~ should be ~~considered~~ made when the treatment needs are beyond the treating dentist's ~~ability or interest~~ scope of practice.

Chronic conditions: Chronic conditions affecting the adolescent include, but are not limited to, gingivitis, puberty gingivitis, hyperplastic gingivitis related to orthodontic therapy, gingival recession that may or may not be related to orthodontic therapy, drug-related gingivitis, pregnancy gingivitis, localized juvenile periodontitis, and periodontitis.~~21, 28,29,32~~ 24,31,32,33 Personal oral hygiene and regular professional intervention can minimize occurrence of these conditions and prevent irreversible damage.

Recommendations: The adolescent will benefit from an individualized preventive dental health program, which includes the following items aimed specifically at periodontal health:

1. Patient education emphasizing the etiology, characteristics, and prevention of periodontal diseases, as well as self-hygiene skills. 32-34
2. A personal, age-appropriate oral hygiene program including plaque removal, oral health self-assessment, and diet. Sulcular brushing and flossing should be included in plaque removal, and frequent follow-up to determine adequacy of plaque removal and improvement of gingival health should be considered. 32-36
3. Regular professional intervention, the frequency of which should be based on individual needs and should include evaluation of personal oral hygiene success, periodontal status, and potential complicating factors such as medical conditions, malocclusion, or handicapping conditions. Periodontal probing, periodontal charting, and radiographic periodontal diagnosis should be a consideration when caring for the adolescent. The extent and nature of the periodontal evaluation should be determined professionally on an individual basis. Those patients with progressive periodontal disease should be referred ~~to an appropriately trained and/or experienced dentist for evaluation and treatment.~~ when the treatment needs are beyond the treating dentist's scope of the practice. 32-34,36
4. Appropriate evaluation for procedures to facilitate orthodontic treatment including, but not limited to, tooth exposure, frenectomy, fiberotomy, gingival augmentation, and implant placement.~~33~~37

Occlusal considerations

Malocclusion can be a significant treatment need in the adolescent population as both environmental and genetic factors come into play. Although the genetic basis of much malocclusion makes it unpreventable, numerous methods exist to treat the occlusal disharmonies, temporomandibular joint dysfunction, periodontal disease, and disfiguration, which may be associated with malocclusion. Within the area of occlusal problems are several tooth/jaw-related discrepancies that can affect the adolescent. Third molar malposition and temporomandibular disorders require special attention to avoid long-term problems. Congenitally missing teeth present complex problems for the adolescent and often require combined orthodontic and restorative care for satisfactory resolution.

Malocclusion: Any tooth/jaw positional problems that present significant esthetic, functional, physiologic, or emotional dysfunction are potential difficulties for the adolescent. These can include single or multiple tooth malpositions, tooth/jaw size discrepancies, and craniofacial disfigurements.

Recommendations: ~~Any~~ ~~m~~Malposition of teeth, malrelationship of teeth to jaws, tooth/jaw size discrepancy, ~~bimaxillary~~ skeletal malrelationship, or craniofacial malformations or disfigurement that presents functional, esthetic, physiologic, or emotional problems to the adolescent should be referred for ~~evaluated~~ evaluation when the treatment needs are beyond the treating dentist's scope of practice. ~~by an appropriately trained dentist or professional team~~. Treatment of malocclusion by ~~an appropriately trained and/or experienced~~ dentist should be based on professional diagnosis, available treatment options, patient motivation and readiness, and other factors to maximize progress. [48]

Third molars: Third molars can present acute and chronic problems for the adolescent. Impaction or malposition leading to such problems as pericoronitis, caries, cysts, or periodontal problems merits evaluation for removal.[~~32, 34~~] [36,38]~~The role of~~ The third molar as a functional tooth also should be considered. Although prophylactic removal of all impacted or unerupted disease-free third molars is not indicated, consideration should be given to removal by the third decade when there is a high probability of disease or pathology and/or the risks associated with early removal are less than the risks of later removal.

Recommendations: Evaluation of third molars, including radiographic diagnostic aids, should be an integral part of the dental examination of the adolescent.[25][28] For diagnostic and extraction criteria, refer to AAPD's Guideline on Pediatric Oral Surgery.[35][39] ~~Treatment of third molars that are potential or active problems should be performed by an appropriately trained and/or experienced~~ a licensed ~~dentist.~~ Referral should be made if treatment is beyond the treating dentist's scope of practice.

Temporomandibular joint (TMJ) problems: Disorders of the TMJ can occur at any age, but appear to be more prevalent in adolescence ~~may provide the stimulus to trigger problems.~~[36-39][39-41]

Recommendations: Evaluation of the TMJ and related structures should be a part of the examination of the adolescent. ~~Abnormalities should be managed by an appropriately trained and/or experienced dentist following accepted clinical procedures.~~ Referral should be made when the treatment needs are beyond treating dentist's scope of practice.[40.][41][44,45]

Congenitally missing teeth: The impact of a congenitally missing permanent tooth on the developing dentition can be significant.[3] When treating adolescent patients with congenitally, missing teeth, many factors must be taken into consideration including, but not limited to, esthetics, patient age, and growth potential, as well as periodontal and oral surgical needs.[42-44][46-48]

Recommendations: Evaluation of congenitally missing permanent teeth should include both immediate and long-term management. ~~Management~~ Referral should be made when the treatment needs are beyond the treating dentist's scope of practice by ~~an appropriately trained and/or experienced dentist, and a~~ A team approach may be indicated.[45][49]

Ectopic eruption and impacted teeth: Abnormal eruption patterns of the adolescent's permanent teeth can contribute to root resorption, bone loss, gingival defects, space loss, and esthetic concerns. Early diagnosis and treatment of ectopically erupting teeth can result in a healthier and more esthetic dentition. Prevention and treatment may include extraction

of deciduous teeth, surgical intervention, and/or endodontic, orthodontic, periodontal, and/or restorative care.[46-50]50-52

Recommendations: The dentist should be proactive in diagnosing and treating ectopic eruption and impacted teeth in the young adolescent. Early diagnosis, including appropriate radiographic examination[25]28 ~~of ectopic eruption~~, is important. Referral should be made when the treatment needs are beyond the treating dentist's scope of practice. A~~n appropriately trained and/or experienced dentist should manage treatment, and~~ A team approach may be necessary.[45]49

Traumatic injuries

The most common injuries to permanent teeth occur secondary to falls, followed by traffic accidents, violence, and sports.[51-54]54-57 All sporting activities have an associated risk of orofacial injuries due to falls, collisions, and contact with hard surfaces.[55]59 The administrators of youth, high school, and college organized sports have demonstrated that dental and facial injuries can be reduced significantly by introducing mandatory protective equipment such as face guards and mouthguards. Additionally, youths participating in leisure activities such as skateboarding, rollerskating, and bicycling also benefit from appropriate protective equipment.[56, 57]60,61

Recommendations: Dentists should introduce a comprehensive trauma prevention program to help reduce the incidence of traumatic injury to the adolescent dentition. This prevention plan should consider assessment of the patient's sport or activity, including level and frequency of activity.[58]62 Once this information is acquired, recommendation and fabrication of an age-appropriate, sport-specific, and properly-fitted mouthguard/faceguard can be initiated.[58]62 Players must be warned about altering the protective equipment that will disrupt the fit of the appliance. In addition, players and parents must be informed that injury may occur, even with properly fitted protective equipment.[58]62

Additional considerations in oral/dental management of the adolescent

The adolescent can present particular psychosocial characteristics that impact the health status of the oral cavity, care seeking, and compliance. The self-concept development

process, emergence of independence, and the influence of peers are just a few of the psychodynamic factors impacting dental health during this period.[1, 5, 7,16]

Discolored or stained teeth: Desire to improve esthetics of the dentition by tooth whitening and removal of stained areas or defects can be a concern of the adolescent. Indications for the appropriate use of tooth-whitening methods and products are dependent upon correct diagnosis.[~~59~~63]

The dentist must determine the appropriate mode of treatment. Use of bleaching agents, microabrasion, placement of an esthetic restoration, or a combination of treatments all can be considered.[~~60~~64]

Recommendations: For the adolescent patient, judicious use of bleaching can be considered part of a comprehensive, sequenced treatment plan that takes into consideration the patient's dental developmental stage, oral hygiene, and caries status. A dentist should monitor the bleaching process, ensuring the least invasive, most effective treatment method. Dental professionals also should consider possible side effects when contemplating dental bleaching for adolescent patients.[~~61, 62~~65,66]

Tobacco use: Significant oral, dental, and systemic health consequences and death are associated with all forms of tobacco use. Smoking and other tobacco use almost always are initiated and established in adolescence.[~~63-68~~67-72]

Recommendations: Education of the adolescent patient on the oral and systemic consequences of tobacco use should be part of each patient's oral health education. For those adolescent patients who use tobacco products, the practitioner should provide or refer the patient to appropriate educational and counseling services.[~~69-71~~73-75]When associated pathology is present, ~~treatment should be managed by an appropriately trained and/or experienced health care provider~~ referral should be made when the treatment needs are beyond the treating dentist's scope of practice.

Positive youth development: Treatment and management of adolescent oral health that takes into account the adolescent's psychological and social needs can be approached through the framework of positive youth development (PYD). [~~72~~76] The approach goes

beyond traditional prevention, intervention, and treatment of risky behaviors and problems and suggests that a strong interpersonal relationship between the adolescent patient and the pediatric dentist can be influential in improving adolescent oral health and transitioning patients to adult care. In the office, dental professionals have a unique opportunity to serve as positive role models.

Recommendations: ~~PYD should be recognized as containing a number of key elements relevant to care patients of this age:~~

~~1. providing youth with safe and supportive environments;~~ [76]

~~2. fostering relationships between young people and caring adults who can mentor and guide them.~~ [76]

~~3. promoting healthy lifestyles and teaching positive patterns of social interaction.~~[76]

~~4. providing a safety net in times of need.~~[72][76]

Integrating PYD into clinical practice can be attained through continuing education on adolescent development issues, as well as partnerships with community-based organizations and schools. The dentist can be a part of the myriad of adolescent support and services.[76]

Psychosocial and other considerations: Behavioral considerations when treating an adolescent may include anxiety, phobia, or intellectual dysfunction.[1] ~~These special needs should be managed by an appropriately trained dentists.~~ Referral should be made when the treatment needs are beyond the treating dentist's scope of practice, ~~to~~ and nondental professionals or a team approach may be indicated.

Additional examples of oral problems associated with adolescent behaviors include, but are not limited to:

1. oral manifestations of venereal diseases;
2. effects of oral contraceptives or antibiotics on periodontal structures;
3. perimyolysis (severe enamel erosion) in bulimia[73][77]
4. traumatic injury to teeth and oral structures in athletic or other activities (short- and long-term management) ~~[57,74-76]~~[60,78-80]
5. intraoral and perioral piercing with possible local and systemic effects.~~[77, 78]~~[81,82]

The impact of psychosocial factors relating to oral health must include consideration of the following:

1. changes in dietary habits (e.g., fads, freedom to snack, increased energy needs, access to carbohydrates);
2. use ~~and abuse~~ of tobacco, alcohol and drugs;
3. motivation for maintenance of good oral hygiene;
4. potential for traumatic injury;
5. adolescent as responsible for care;
6. lack of knowledge about periodontal disease.

Physiologic changes also can ~~account for~~ ~~significant~~ contribute to oral ~~problems~~ concerns in the adolescent. These physiologic changes include:

1. loss of remaining primary teeth;
2. eruption of remaining permanent teeth;
3. gingival maturity;
4. facial growth;
5. hormonal changes.

Recommendations:

1. ~~Oral health care of the adolescent~~ Adolescent's oral health care should be provided by a dentist who has appropriate training in managing the patient's specific needs. Referral should made when the treatment needs are beyond the treating dentist's scope of practice. ~~The primary care dentist should consider referral to a specialist for treatment of particular problems outside his or her expertise~~. This may include both dental and nondental problems. [76]
2. Attention should be given to the particular psychosocial aspects of adolescent dental care. Other issues such as consent, confidentiality, and compliance should be addressed in the care of these patients.[~~79, 80~~83,85]
3. A complete oral health care program for the adolescent requires an educational component that addresses the particular concerns and needs of the adolescent patient and focuses on:

a. specific behaviorally-and physiologically-induced oral manifestations in this age group; [20]

b. shared responsibility for care and health by the adolescent and provider;[20]

c. consequences of adolescent behavior on oral health. [86,87]

Transitioning to adult care: As adolescent patients approach the age of majority, it is important to educate the patient and parent on the value of transitioning to a dentist who is knowledgeable in adult oral health care. The adult's oral health needs may go beyond the scope of the pediatric dentist's training. The transitioning adolescent should continue professional oral health care in an environment sensitive to his/her individual needs. Many adolescent patients independently will choose the time to seek care from a general dentist and may elect to seek treatment from a parent's primary care provider. In some instances, however, the treating pediatric dentist will be required to suggest transfer to adult care.

Pediatric dentists are concerned about decreased access to oral health care for persons with special health care needs (SHCN) [8188] as they transition beyond the age of majority. Pediatric hospitals, by imposing age restrictions, can create a barrier to care for these patients. Transitioning to a dentist who is knowledgeable and comfortable with adult oral health care needs often is difficult due to a lack of trained providers willing to accept the responsibility of caring for SHCN patients.

Recommendations: At a time agreed upon by the patient, parent, and pediatric dentist, the patient should be transitioned to a dentist knowledgeable and comfortable with managing that patient's specific oral care needs. For the SHCN patient, in cases where it is not possible or desired to transition to another practitioner, the dental home can remain with the pediatric dentist and appropriate referrals for specialized dental care should be recommended when needed.[8288]

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Guideline on Pediatric Oral Surgery

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2005

Revised
2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) intends this guideline to define, describe clinical presentation, and set forth general criteria and therapeutic goals for common pediatric oral surgery procedures that have been presented in considerably more detail in textbooks and the dental/medical literature.

Methods

This guideline is an update of the previous document adopted in 2005. It is based on a review of the current dental and medical literature related to pediatric oral surgery~~.~~, including a systemic literature search of the ~~A~~ MEDLINE/Pubmed electronic database with the following TERMS: ~~search was conducted using the terms~~ "pediatric", "oral surgery", "extraction", "odontogenic infections", "impacted canines", "third molars", "supernumerary teeth", "mesiodens", "mucocele", "eruption cyst", "eruption hematoma", "attached frenum", "ankyloglossia", "gingival keratin cysts", "Epstein pearls", "Bohn's nodules", "congenital epulis of newborn", "dental lamina cysts", "natal teeth", and "neonatal teeth". Fields: All Fields; Limits: within the last ten years; humans; English; clinical trials. 7761 articles matched these criteria. Papers for review were chosen from this list and from references within selected articles. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians. ~~Also~~ In addition, the manual Parameters and

Pathways: Clinical Practice Guidelines for Oral and Maxillofacial Surgery,[1] developed by the American Association of Oral and Maxillofacial Surgeons (AAOMS), was consulted.

Background

Surgery performed on pediatric patients involves a number of special considerations unique to this population. Several critical issues deserve to be addressed. These include:

1. preoperative evaluation;
    a. medical;
    b. dental;
2. behavioral considerations;
3. growth and development;
4. developing dentition;
5. pathology;
6. perioperative care.

Preoperative evaluation

Medical

Important considerations in treating a pediatric patient include obtaining a thorough medical history, obtaining appropriate medical and dental consultations, anticipating and preventing emergency situations, and being prepared to treat emergency situations.[2,3]

Dental

It is important to perform a thorough clinical and radiographic preoperative evaluation of the dentition as well as extraoral and intraoral soft tissues.[2,~~4~~3] Radiographs can include intraoral films and extraoral imaging ~~often include 1 or more intraoral films and may include extraoral imaging~~ if the area of interest extends beyond the dentoalveolar complex.

Behavioral considerations

Behavioral guidance of children in the operative and perioperative periods presents a special challenge. Many children benefit from modalities beyond local anesthesia, nitrous

oxide-oxygen inhalation and oral ~~premedication~~ sedation to control their anxiety.[2,5] ~~Anesthetic m~~Management of children under deep sedation or general anesthesia requires extensive training and expertise.[2,6]

Special attention should be given to the assessment of the social, emotional, and psychological status of the pediatric patient prior to surgery.[4,7] Children have many unvoiced fears concerning the surgical experience, and their psychological management requires that the dentist be cognizant of their emotional status. Answering questions concerning the surgery is important and should be done in the presence of the parent. The dentist also should obtain informed consent[5,8] prior to the procedure.

Growth and development

The potential for adverse effects on growth from injuries and/or surgery in the oral and maxillofacial region markedly increases the potential for risks and complications in the pediatric population. Traumatic injuries involving the maxillofacial region can affect growth, development, and function adversely. For example, injuries to the mandibular condyle may not only result in restricted growth, but also limit mandibular function as a result of ankylosis. Surgery for acquired, congenital, or developmental malformations may, in itself, affect growth adversely. This ~~commonly~~ is commonly seen in the cleft patient, for example, where palatal scarring following primary palatal repair may result in maxillary ~~growth abnormalities~~ constriction.[2]

Developing dentition

Surgery involving the maxilla and mandible of young patients is complicated by the presence of developing tooth follicles. Alteration or deviation from standard treatment modalities may be necessary to avoid injuring the follicles. [9] ~~For example, distraction osteogenesis can be a successful treatment option for craniofacial abnormalities in pediatric patients. Nevertheless, this technique can be associated with long-term dental sequelae, including damage to developing teeth, genesis of dentigerous cysts secondary to placement of pins in unerupted tooth follicle spaces, and subsequent malocclusion issues.[6,9]~~ To minimize the negative effects of surgery on the developing dentition, careful planning using

radiographs, tomography[10], cone beam computed tomography[11], ~~tomograms,~~ and/or 3-D imaging techniques is necessary to provide valuable information to assess the presence, absence, location, and/or quality of individual crown and root development.[9]

Pathology

Primary and reconstructive management of tumors in children is affected by anatomical and physiological differences from those of adult patients. Tumors generally grow faster in pediatric patients and are less predictable in behavior. The same physiological factors that affect tumor growth, however, can play a favorable role in healing following primary reconstructive surgery. Pediatric patients are more resilient and heal more rapidly than their adult counterparts.[2]

Perioperative care

Metabolic management of children following surgery frequently is more complex than that of adults. Special consideration should be given to caloric intake, ~~as well as~~ fluid and electrolyte management and blood replacement. Comprehensive management of the pediatric patient following extensive oral and maxillofacial surgery usually is best accomplished in a facility that has the expertise and experience in the management of young patients (ie, a children's hospital).[2,3]

Recommendations

Odontogenic infections

In children, odontogenic infections may involve more than 1 tooth and usually are due to carious lesions, periodontal problems, or a history of trauma.[~~7,8~~12,13] Untreated odontogenic infections can lead to pain, abscess and cellulitis. As a consequence of this, ~~Prompt treatment of infections is important, as~~ children are prone to dehydration—especially if they are not eating well due to pain and malaise. Prompt treatment of the source of infection is important in order to control pain and prevent the spread of infection.

With ~~upper face~~ infections to the upper portion of the face, patients usually complain of facial pain, fever, and inability to eat or drink. Care must be taken to rule out sinusitis, as

symptoms may mimic an odontogenic infection. Occasionally in upper face infections, it may be difficult to find the true cause. Infections of the lower face usually involve pain, swelling, and trismus.~~7~~12 They ~~frequently~~ are frequently associated with teeth, skin, local lymph nodes, and salivary glands.~~7~~12 ~~In lower face swelling, dental infection is diagnosed most frequently~~Swelling of the lower face has been more commonly associated with dental infections.~~9~~14

Most odontogenic infections ~~are not serious and~~ can be managed ~~easily. Treatment involves~~ with pulp therapy, extraction, or incision and drainage.[2] Infections of odontogenic origin with systemic manifestations (eg, elevated temperature of 102° to 104°F, facial cellulitis, difficulty in breathing or swallowing, fatigue, nausea) require antibiotic therapy. Severe but rare complications of odontogenic infections include cavernous sinus thrombosis and Ludwig's angina.[2,~~7~~12] These conditions can be life threatening and may require immediate hospitalization with intravenous antibiotics, incision and drainage, and referral/consultation with an oral and maxillofacial surgeon.[2,~~7~~12]

Extraction of erupted primary teeth

Maxillary and mandibular anterior teeth

Most primary and permanent maxillary and mandibular central incisors, lateral incisors, and canines all have conical single roots. In most cases, extraction of anterior teeth is accomplished with a rotational movement, due to their single root anatomies.[2] However, there have been reported cases of accessory roots observed in primary canines.[15-17] Radiographic examination is helpful to identify differences in root anatomy prior to extraction.[15-17] Care should be taken to avoid placing any force on adjacent teeth that could become luxated or dislodged easily due to their root anatomy.

Maxillary and mandibular molars

Primary molars have roots that are smaller in diameter and more divergent than permanent molars. Root fracture in primary molars is not uncommon due to these characteristics ~~and~~ as well as the potential weakening of the~~ir~~ roots caused by the eruption of their permanent successors.[2] To avoid inadvertent extraction, ~~or~~ dislocation or trauma to ~~of~~ the permanent

successor, ~~consideration should be given to~~ careful evaluation of the relationship of the primary roots to the ~~permanent successor crown~~ succedaneous developing tooth should be completed. Primary molars with roots encircling the successor's crown may need to be sectioned to protect the permanent tooth's location.[2]

Molar extractions are accomplished by using slow continuous palatal/lingual and buccal force allowing for the expansion of the alveolar bone to accommodate the divergent roots and reduce the risk of root fracture.[2] When extracting mandibular molars, care should be taken to support the mandible to protect the temporomandibular joints from injury.[2]

~~*Maxillary and mandibular anterior teeth*~~

~~Primary and permanent maxillary and mandibular central incisors, lateral incisors, and canines all have conical single roots. Extraction of anterior teeth is accomplished with a rotational movement, due to their single root anatomies.[2] Care should be taken to avoid placing any force on adjacent teeth that could become luxated or dislodged easily due to their root anatomy.~~

Fractured primary tooth roots

The dilemma to consider when treating a fractured primary tooth root is that removing the root tip may cause damage to the succedaneous tooth, while leaving the root tip may increase the chance for postoperative infection and delay eruption of the permanent successor.[2] Use of appropriate radiographs can ~~aide~~ assist in the decision process. The literature suggests that, if the fractured ~~tooth~~ root tip can be removed easily, it should be removed.[2] If the root tip is very small, located deep in the socket, situated in close proximity to the permanent successor, or unable to be retrieved after several attempts, it is best left to be resorbed.[2]

Unerupted and impacted teeth

Impacted canines

~~M~~Permanent maxillary canines are second to third molars in frequency of impaction.[~~10~~18] Early detection of an ectopically erupting canine through visual inspection, palpation and

radiographic examination is important to minimize such an occurrence.[19] Panoramic and periapical films are useful in locating potentially ectopic canines.[20] Routine evaluation of patients in mid-mixed dentition should involve identifying signs such as lack of canine bulges, asymmetry in pattern of exfoliation and eruption of canines and abnormal angulation or ectopic eruption of developing permanent cuspids in a radiograph.[19] When the cusp tip of the permanent canine is just mesial to or overlaying the distal half of the long axis of the root of the permanent lateral incisor, canine palatal impaction usually occurs.[11,20] Extraction of the primary canines is the treatment of choice when malformation or ankylosis is present, when the risk of resorption of the adjacent tooth is evident or when trying to correct palatally impacted canines, provided there are normal space conditions and no incisor resorption.[10,12,18,21-23] One study showed that 78% of ectopically-erupting permanent canines normalized within 12 months after removal of the primary canines~~:~~; 64% normalized when the starting canine position overlapped the lateral incisor by more than half of the root and 91% normalized when the starting canine position overlapped the lateral incisor by less than half of the root.[10,18] If no improvement in canine position occurs in a year, surgical and/or orthodontic treatment were suggested.[10,18,23] Although a Cochrane review yielded a lack of randomized controlled clinical studies to support extraction of primary canines to facilitate eruption of ectopically erupting permanent maxillary canines,[21] the literature suggests that this can be considered to minimize complications resulting from impacted canines. Consultation between the practitioner and an orthodontist may be useful in the final treatment decision.

Third molars

Panoramic or periapical radiographic examination is indicated in late adolescence to assess the presence, position, and development of third molars.[3,4] AAOMS recommends that a decision to remove or retain third molars should be made before the middle of the third decade.[1] Little controversy surrounds their removal when pathology (eg, cysts, ~~or~~ tumors, ~~nonrestorable or recurrent~~ caries, periodontal disease, infection, ~~or~~ pericoronitis, detrimental changes of adjacent teeth or bone) is associated and/or the tooth is malpositioned or nonfunctional (ie, an unopposed tooth).[1,13,24-26] A systematic review of research literature

from 1984 to 1999 concluded there is no reliable evidence to support the prophylactic removal of disease-free impacted third molars.[13] Although prophylactic removal of all impacted or unerupted disease-free third molars is not indicated, consideration should be given to removal by the third decade when there is a high probability of disease or pathology and/or the risks associated with early removal are less than the risks of later removal.[1,~~24-26~~~~13-15~~] Removing the third molars prior to complete root formation may be surgically prudent.[1] The American Association of Oral and Maxillofacial Surgeons performed an age-related third molar study among board-certified oral maxillofacial surgeons in 2001.[25] They concluded that third molar removal in adults is safe with minimal complications and negative effects on the patient's quality of life. The report showed that mandibular third molars showed more pathology or abnormalities. All intraoperative complications (eg, nerve injury, unexected hemorrhage, unplanned transfusion or parenteral drugs, compromised airway, fracture and other injuries to adjacent tooth/structures) occurred at a frequency less than 1%.[25] Excluding alveolar osteitis, postoperative complications (eg, paresthesia, infection, trismus, hemorrage, etc) were similarly low.[25,26] Factors that increase the risk for complications (eg, coexisting systemic conditions, location of peripheral nerves, history of temporomandibular joint disease, presence of cysts or tumors)[25,26] and position and inclination of the molar in question[27] should be assessed. The age of the patient is only a secondary consideration.[27] Referral to an oral and maxillofacial surgeon for consultation and subsequent treatment may be indicated. When a decision is made to retain impacted third molars, they should be monitored for change in position and/or development of pathology, which may necessitate later removal.

Supernumerary teeth

Supernumerary teeth and hyperdontia are terms to describe an excess in tooth number. Supernumerary teeth are thought to be related to disturbances in the initiation and proliferation stages of dental development.[~~16,17~~15,28] Although some supernumerary teeth may be syndrome associated (eg, cleidocranial dysplasia) or of familial inheritance pattern, most supernumerary teeth occur as isolated events.[~~17~~15]

Supernumerary teeth can occur in either the primary or permanent dentition.~~17-20~~15,29-31 In 33% of the cases, a supernumerary tooth in the primary dentition is followed by the supernumerary tooth complement in the permanent dentition.~~21,22~~32,33 Reports in incidence of supernumerary teeth can be as high as 3%, with the permanent dentition being affected 5 times more frequently than the primary dentition and males being affected twice as frequently as females.~~17-19~~15,29,30

Supernumerary teeth will occur ten times more in the maxillary arch versus the mandibular arch.15 Approximately 90% of all single tooth supernumerary teeth are found in the maxillary arch, with a strong predilection to the anterior region.~~17,20~~15,31 The anterior midline of the maxilla is the most common site, in which case the supernumerary tooth is known as a mesiodens, while the second most common site is in the maxillary molar area (paramolar).~~17-20~~15,29-31 A mesiodens can be suspected if there is an asymmetric eruption pattern of the maxillary incisors, delayed eruption of the maxillary incisors with or without any over-retained primary incisors, or ectopic eruption of a maxillary incisor.~~18,22~~29,33 The diagnosis of a mesiodens can be confirmed with radiographs, including occlusal, periapical, ~~or~~ panoramic films~~23~~34 or computed tomography10,11. Three-dimensional information needed to determine the location of the mesiodens or impacted tooth can be obtained by taking 2 periapical radiographs ~~and by~~ using either 2 projections taken at right angles to one another or the tube shift technique (buccal object rule or Clark's rule)~~23~~34 or by using cone beam computed tomography11.

Complications of supernumerary teeth can include delayed and/or lack of eruption of the permanent tooth, crowding, resorption of adjacent teeth, dentigerous cyst formation, pericoronal space ossification, and crown resorption.~~24,25~~35,36 Early diagnosis and appropriately timed treatment are important in the prevention and avoidance of these complications.

Because only 25% of all mesiodens erupt spontaneously, surgical management ~~usually~~ is often necessary.~~22,26~~33,37 A mesiodens that is conical in shape and is not inverted has a better chance for eruption than a mesiodens that is tubercular in shape and is inverted.~~25~~36 The treatment objective for a nonerupting permanent ~~tooth~~ mesiodens is to minimize eruption problems for the permanent incisors.~~25~~36 Surgical management will vary depending on the

size, shape, and number of supernumeraries and the patient's dental development.[25,36] The treatment objective for a nonerupting primary ~~tooth~~ mesiodens differs in that the removal of these teeth usually is not recommended, as the surgical intervention may disrupt or damage the underlying developing permanent teeth.[24,35] Erupted primary tooth mesiodens typically are left to shed normally upon the eruption of the permanent dentition.[24,35]

Extraction of an unerupted primary or permanent ~~tooth~~ mesiodens is recommended during the mixed dentition to allow the normal eruptive force of the permanent incisor to bring itself into the oral cavity.[25,36] Waiting until the adjacent incisors have at least two thirds root development will present less risk to the developing teeth but still allow spontaneous eruption of the incisors.[1] In 75% of the cases, extraction of the mesiodens during the mixed dentition results in spontaneous eruption and alignment of the adjacent teeth.[24,27,35,38] If the adjacent teeth do not erupt within 6 to 12 months, surgical exposure and orthodontic treatment may be necessary to aid their eruption.[26,28,37,39] The diagnosing dentist may consider a multidisciplinary approach when treating difficult or complex cases.

Pediatric oral pathology

Lesions of the newborn

Oral pathologies occurring in newborn children include Epstein's pearls, dental lamina cysts, Bohn's nodules, and congenital epulis. Epstein's pearls are common, found in about 75% to 80% of newborns.[29-32,40-43] They occur in the median palatal raphe area[29-33,40-44] as a result of trapped epithelial remnants along the line of fusion of the palatal halves.[31,33,42,44] Dental lamina cysts, found on the crests of the dental ridges, most commonly are seen bilaterally in the region of the first primary molars.[31,42] They result from remnants of the dental lamina. Bohn's nodules are remnants of salivary gland epithelium and usually are found on the buccal and lingual aspects of the ridge, away from the midline.[29,30,32,40,41,43] Epstein's pearls, Bohn's nodules, and dental lamina cysts typically present as asymptomatic 1 mm to 3 mm nodules or papules. They are smooth, whitish in appearance, and filled with keratin.[30,31,41,42] No treatment is required, as these cysts usually disappear during the first 3 months of life.[30,33,41,44]

Congenital epulis of the newborn, also known as granular cell tumor or Neumann's tumor, is a rare benign tumor seen only in newborns. This lesion is typically a protuberant mass arising from the gingival mucosa. It is most often found on the anterior maxillary ridge.[34,35]45,46 Patients typically present with feeding and/or respiratory problems.[35]46 Congenital epulis has a marked predilection for females at 8:1 to 10:1.[34-36]45-47 Treatment normally consists of surgical excision.[34,36]45,47 The newborn usually heals well, and no future complications or treatment should be expected.

Eruption cyst (eruption hematoma)

The eruption cyst is a soft tissue cyst that results from a separation of the dental follicle from the crown of an erupting tooth.[30,37]41,48 Fluid accumulation occurs within this created follicular space.[29,32,37,38]40,43,48,49 Eruption cysts most commonly are found in the mandibular molar region.[37]48 Color of these lesions can range from normal to blue-black or brown, depending on the amount of blood in the cystic fluid.[29,32,37,38]40,43,48,49 The blood is secondary to trauma. If trauma is intense, these blood-filled lesions sometimes are referred to as eruption hematomas.[29,32,37,38]40,43,48,49

Because the tooth erupts through the lesion, no treatment is necessary.[29,32,37,38]40,43,48,49 If the cyst does not rupture spontaneously or the lesion becomes infected, the roof of the cyst may be opened surgically.[29,32,37]40,43,48

Mucocele

The mucocele is a common lesion in children and adolescents resulting from the rupture of a minor salivary gland excretory duct, with subsequent ~~spillage~~ leakage of mucin into the surrounding connective tissues that later may be surrounded in a fibrous capsule.[30,32,39-41,43,50-52] Most mucoceles are well-circumscribed bluish translucent fluctuant swellings (although deeper and long-standing lesions may range from normal in color to having a whitish keratinized surface) that are firm to palpation.[32,39,41]43,50,52 Local mechanical trauma to the minor salivary gland is often the cause of rupture.[32,39-41]43,50-52 ~~At least 75% of cases are found on the~~ Mucoceles are most frequently observed on the lower lip, usually lateral to the

midline.[39~~50~~] Mucoceles also can be found on the buccal mucosa, ventral surface of the tongue, retromolar region, and floor of the mouth (ranula).[39,40~~50-52~~]

Superficial mucoceles and some mucoceles are short-lived lesions that burst spontaneously, leaving shallow ulcers that heal within a few days.[~~32,39-41~~43,50-52] Many lesions, however, require treatment ~~local surgical excision with the removal of adjacent minor salivary glands~~ to minimize the risk of recurrence.[~~32,39-41~~43,50-52]

Structural anomalies

Maxillary frenum

A high or prominent maxillary frenum in children, although a common finding, is often a concern, especially when associated with a diastema. A comparison of attached frena with and without diastemas found no correlation between the height of the frenum attachment and diastema presence and width.[42~~53~~] ~~Recent trends justify significantly fewer frenectomies.[43]~~ Treatment is ~~necessary only~~ suggested when the attachment exerts a traumatic force on the gingiva causing the papilla to blanch when the upper lip is pulled or if it causes a diastema to remain after eruption of the permanent canines.[~~43~~54,55] Interference with oral hygiene measures, esthetics and psychological reasons are contributing factors relating to treatment of the maxillary frenum.[54,56] Treatment options can include orthodontics, restorative dentistry, surgery or a combination of these.[54] When a diastema is present, the objectives for treatment involve managing both the diastema of permanent teeth and its cause while maintaining stable results in the future.[54] It is recommended that ~~T~~treatment ~~should be~~ is delayed until the permanent incisors and cuspids have erupted and the diastema has had an opportunity to close naturally.[~~43~~55] ~~In an older child, if a frenum is present and the papilla blanches when the upper lip is pulled, removal can be indicated.[44]~~ ~~Again, t~~The frenectomy should be performed only after orthodontic treatment is completed and the diastema is closed as much as possible to achieve stable results.[54] When indicated, a maxillary frenectomy is a fairly simple procedure and can be performed in the office setting.

Mandibular labial frenum

A high frenum sometimes can present on the labial aspect of the mandibular ridge. This is most often seen in the central incisor area and frequently occurs in individuals where the vestibule is shallow.~~45~~57 The mandibular anterior frenum, as it is known, occasionally inserts into the free or marginal gingival tissue.~~45~~57 Movements of the lower lip cause the frenum to pull on the fibers inserting into the free marginal tissue, which, in turn, can lead to food and plaque accumulation.~~45~~57 Early treatment ~~is~~ can be considered ~~indicated~~ to prevent subsequent inflammation, recession, pocket formation, and possible loss of the alveolar bone and/or tooth.~~45~~57 However, if factors causing gingival/periodontal inflammation are controlled, the degree of recession and need for treatment decreases.[58]

Mandibular lingual frenum/ankyloglossia

Ankyloglossia is a developmental anomaly of the tongue characterized by a short, thick lingual frenum resulting in limitation of tongue movement (partial ankyloglossia) or if the tongue appears to be fused to the floor of the mouth (total ankyloglossia).~~33~~44,58 The reported prevalence is 0.1-10.7% of the population.58,~~58~~ ~~It can be categorized into 2 types. Total ankyloglossia is rare and occurs when the tongue is completely fused to the floor of the mouth. Partial ankyloglossia is variable and encompasses the remainder of the cases.~~

The exact cause of ankyloglosia remains unknown[58], however it has been associated with problems with breast-feeding among neonates,[58-61] tongue mobility and speech,[54,58,62] malocclusion[58,63,64] and gingival recession.[58] During breast-feeding, a short frenum can cause ineffective latch, inadequate milk transfer and intake, and persistent maternal nipple pain, all of which can affect feeding adversely.[58-61] When indicated, frenuloplasty or frenotomy may be a successful approach to facilitate breast-feeding, however, there is a lack of reliable indications for or against treatment based on evidence-based literature. This indicates that there is a need to standardize a classification system and justify parameters for surgical correction of ankyloglossia among neonates.[58-63] Limitations in tongue mobility and speech pathology have been associated with ankyloglossia.[2,54,58,62] There has been varied opinion among health care professionals regarding the correlation between ankyloglossia and speech disorders.[58,62] Frenuloplasty or frenectomy in conjunction with speech therapy can be a treatment option to improve~~s~~ tongue mobility and speech.[62] Further evidence is

needed to determine the benefit of surgical correction of ankyloglossia in resolving speech pathology.[58] There is limited evidence to show an association between ankyloglossia and Class III malocclusion.[58,64] Speculations have been made that the abnormal tongue position may affect skeletal development.[58,63,64] Although there are no clear recommendations in the literature, a complete orthodontic workup, diagnosis, and treatment plan is necessary prior to any surgical intervention.[58] Reports have also been made regarding the association between frenal attachment and gingival recession, however, further clinical evidence is warranted to show a clear relationship between these two factors.[58] Elimination of plaque induced gingival inflammation can minimize gingival recession without any surgical intervention.[58]

The significance and management of ankyloglossia are very controversial due to the lack of evidence based studies to support frenotomy, frenectomy and frenuloplasty among children and adults affected by ankyloglossia.[58,62] Studies have shown a difference in treatment recommendations among speech pathologists, pediatricians, otolaryngologists, ~~and~~ lactation specialists, surgeons and dental specialists.[46,47~~58~~-63,65] Most professionals, however, will agree that there are certain indications for these procedures~~frenectomy,~~.[63] A short lingual frenum can inhibit tongue movement and create deglutition problems.[47~~65~~] If there is no improvement in breast-feeding of a child with ankyloglossia after non-surgical intervention, frenotomy may be indicated.[58] Although there is a limited amount of evidence in the literature to promote the timing, indication and type of surgical intervention, f~~F~~renectomy or frenuloplasty for functional ~~problems~~limitations due to severe ankyloglossia should be considered on an individual basis.[58] If evaluation shows that function ~~will~~ may be improved by surgery, treatment should be considered.[47~~65~~,48]

~~Ankyloglossia also can lead to problems with breast-feeding, speech pathology, malocclusion, and periodontal health. During breast-feeding, a short frenum can cause ineffective latch, inadequate milk transfer, and maternal nipple pain, all of which can affect feeding adversely.[49,50] When indicated, frenuloplasty seems to be a successful approach to facilitate breast-feeding.[49] Although not as common as once thought, speech pathology has been associated with ankyloglossia.[2,43,51,52] In such cases, frenectomy can be a treatment option that improves tongue mobility and speech.[52] It should not be performed, however,~~

~~until an evaluation and therapy by a qualified speech therapist have been completed.[2]~~ ~~Ankyloglossia also has been associated with Class III malocclusion.[53,54] The abnormal tongue position may affect skeletal development. Although there are no clear recommendations, frenectomy in these cases should be deferred until a complete orthodontic workup, diagnosis, and treatment plan have been completed and any necessary referrals obtained.~~

Frenectomy Techniques

Conventional frenectomy involves surgical incision, control of hemostasis and suturing of the wound.[66] Dressing placement or the use of antibiotics are not necessary.[66] Recommendations include maintaining a soft diet, regular oral hygiene and analgesics as needed.[66] Although there is minimal evidence based research available, the use of laser technology and electrosurgery for frenectomies have demonstrated a shorter operative working time, the ability to quickly control hemostasis, reduced pain and discomfort, less post-operative complications (pain, swelling, infection, no need for suture removal), as well as increasing patient acceptance.[66-69] These procedures require skilled technique and patient management[66,69].

Natal and neonatal teeth

Natal and neonatal teeth can present a challenge when deciding on appropriate treatment. Natal teeth have been defined as those teeth present at birth, and neonatal teeth are those that erupt during the first 30 days of life.[55~~71~~] The occurrence of natal and neonatal teeth is rare; the incidence varies from 1:1,000 to 1:3~~0~~,000.[56~~70~~,71] The teeth most often affected are the mandibular primary incisors.[57~~2~~] In most cases, anterior natal and neonatal teeth are part of the normal compliment of the dentition.[70,71] Natal or neonatal molar teeth have also been identified in the posterior region and may be associated with systemic conditions or syndromes (eg, Pfieffer syndrome or Histiocytosis X).[72-74] Although many theories exist as to why the teeth ~~occur~~erupt prematurely, currently no studies confirm a causal relationship with any of the proposed theories. The superficial position of the tooth germ associated with a hereditary factor seems to be the most accepted possibility.[56,57~~1~~]

If the tooth is not excessively mobile or causing feeding problems, it should be preserved and maintained in a healthy condition if at all possible.[56,58]71,75 Close monitoring is indicated to ensure that the tooth remains stable.

Riga-Fede disease is a condition caused by the natal or neonatal tooth rubbing the ventral surface of the tongue during feeding ~~and causing~~ leading to ulceration.[58,59]69,70 Failure to diagnose and properly treat this lesion can result in dehydration and inadequate nutrient intake for the infant.[58]75 Treatment should be conservative and focus on creating round, smooth incisal edges.~~, if at all possible, consisting of smoothing rough incisal edges or placing resin over the edge of the tooth to round~~ it.[56-59]71-76 If conservative treatment does not correct the condition, extraction is the treatment of choice.[56,59]71,76

An important consideration when deciding to extract a natal or neonatal tooth is the potential for hemorrhage. Extraction is contraindicated in newborns due to risk of hemorrhage.[60]77 Unless the child is at least 10 days old consultation with the pediatrician regarding adequate hemostasis may be indicated prior to extraction of the tooth.

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Guideline on Oral and Dental Aspects of Child Abuse and Neglect

Originating Group
American Academy of Pediatrics Committee on Child Abuse and Neglect and the American Academy of Pediatric Dentistry

Review Group
American Academy of Pediatrics Committee on Child Abuse and Neglect and the American Academy of Pediatric Dentistry Council on Clinical Affairs

Adopted
1999

Revised
2005

Reaffirmed
2010

Abstract

In all 50 states, physicians and dentists are required to report suspected cases of abuse and neglect to social service or law enforcement agencies. The purpose of this report is to review the oral and dental aspects of physical and sexual abuse and dental neglect and the role of physicians and dentists in evaluating such conditions. This report addresses the evaluation of bite marks as well as perioral and intraoral injuries, infections, and diseases that may be suspicious for child abuse or neglect. Physicians receive minimal training in oral health and dental injury and disease and, thus, may not detect dental aspects of abuse or neglect as readily as they do child abuse and neglect involving other areas of the body. Therefore, physicians and dentists are encouraged to collaborate to increase the prevention, detection, and treatment of these conditions.

Physical abuse

Craniofacial, head, face, and neck injuries occur in more than half of the cases of child abuse.[1-10] A careful and thorough intraoral and perioral examination is necessary in all cases of suspected abuse and neglect. In addition, all suspected victims of abuse or neglect, including children in state custody or foster care, should be examined carefully not only for

signs of oral trauma but also for caries, gingivitis, and other oral health problems. Some authorities believe that the oral cavity may be a central focus for physical abuse because of its significance in communication and nutrition.[11]

Oral injuries may be inflicted with: instruments such as eating utensils or a bottle during forced feedings; hands; fingers; or scalding liquids or caustic substances.

The abuse may result in: contusions, burns, or lacerations of the tongue, lips, buccal mucosa, palate (soft and hard), gingivae, alveolar mucosa, or frenum; fractured, displaced, or avulsed teeth; or facial bone and jaw fractures.

In one study,[12] the lips were the most common site for inflicted oral injuries (54%), followed by the oral mucosa, teeth, gingivae, and tongue. Discolored teeth, indicating pulpal necrosis, may result from previous trauma.[13,14] Gags applied to the mouth may result in bruises, lichenification, or scarring at the corners of the mouth.[15]

Some serious injuries of the oral cavity, including posterior pharyngeal injuries and retropharyngeal abscesses, may be inflicted by caregivers with factitious disorder by proxy[16] to simulate hemoptysis or other symptoms requiring medical care; regardless of caregiver motive, all inflicted injuries should be reported for investigation. Unintentional or accidental injuries to the mouth are common and must be distinguished from abuse by judging whether the history, including the timing and mechanism of injury, is consistent with the characteristics of the injury and the child's developmental capabilities. Multiple injuries, injuries in different stages of healing, or a discrepant history should arouse a suspicion of abuse. Consultation with or referral to a knowledgeable dentist may be helpful.

Sexual abuse

Although the oral cavity is a frequent site of sexual abuse in children,[17] visible oral injuries or infections are rare. When oral-genital contact is suspected, referral to specialized clinical settings equipped to conduct comprehensive examinations is recommended. The American Academy of Pediatrics statement "Guidelines in the Evaluation of Sexual Abuse of Children"[18] provides information regarding these examinations.

Oral and perioral gonorrhea in prepubertal children, diagnosed with appropriate culture techniques and confirmatory testing, is pathognomonic of sexual abuse[19] but rare

among prepubertal girls evaluated for sexual abuse.[20] Pharyngeal gonorrhea is frequently asymptomatic.[21] When oral-genital contact is confirmed by history or examination findings, universal testing for sexually transmitted diseases within the oral cavity is controversial; the clinician should consider risk factors (eg, chronic abuse, perpetrator with a known sexually transmitted disease) and the child's clinical presentation in deciding whether to conduct such testing. Although human papillomavirus infection may result in oral or perioral warts, the mode of transmission remains uncertain and debatable. Human papillomavirus infections may be sexually transmitted through oral-genital contact, vertically transmitted from mother to infant during birth, or horizontally transmitted through nonsexual contact from a child or caregiver's hand to the genitals or mouth.[22]

Unexplained injury or petechiae of the palate, particularly at the junction of the hard and soft palate, may be evidence of forced oral sex.[23] As with all suspected child abuse or neglect, when sexual abuse is suspected or diagnosed in a child, the case must be reported to child protective services and/or law enforcement agencies for investigation.[24-27] A multidisciplinary child abuse evaluation for the child and family should be initiated.

Children who present acutely with a recent history of sexual abuse may require specialized forensic testing for semen and other foreign materials resulting from assault. If a victim provides a history for oral-penile contact, the buccal mucosa and tongue can be swabbed with a sterile cotton-tipped applicator, then the swab can be air-dried and packaged appropriately for laboratory analysis. However, specialized hospitals and clinics equipped with protocols and experienced personnel are best suited for collecting such material and maintaining a chain of evidence necessary for investigations.

Bite marks

Acute or healed bite marks may indicate abuse. Dentists trained as forensic odontologists can assist physicians in the detection and evaluation of bite marks related to physical and sexual abuse.[28] Bite marks should be suspected when ecchymoses, abrasions, or lacerations are found in an elliptical or ovoid pattern. Bite marks may have a central area of ecchymoses (contusions) caused by 2 possible phenomena: positive pressure from the closing of the teeth with disruption of small vessels or negative pressure caused by suction and tongue

thrusting. Bites produced by dogs and other carnivorous animals tend to tear flesh, whereas human bites compress flesh and can cause abrasions, contusions, and lacerations but rarely avulsions of tissue. An intercanine distance (ie, the linear distance between the central point of the cuspid tips) measuring more than 3.0 cm is suspicious of an adult human bite.[29]

The pattern, size, contour, and color of the bite mark should be evaluated by a forensic odontologist or a forensic pathologist if an odontologist is not available. If neither specialist is available, a physician or dentist experienced in the patterns of child abuse injuries should observe and document the bite mark characteristics photographically with an identification tag and scale marker (eg, ruler) in the photograph. The photograph should be taken such that the angle of the camera lens is directly over the bite and perpendicular to the plane of the bite to avoid distortion. A special photographic scale was developed by the American Board of Forensic Odontology (ABFO) for this purpose, as well as for documenting other patterned injuries, and can be obtained from the vendor (ABFO No. 2 reference scale, available from Lightening Powder Co Inc, Salem, Ore). Names and contact information for ABFO certified odontologists can be obtained from the ABFO Web site (www.abfo.org).

In addition to photographic evidence, every bite mark that shows indentations should have a polyvinyl siloxane impression made immediately after swabbing the bite mark for secretions containing DNA. This impression will help provide a 3-dimensional model of the bite mark. Written observations and photographs should be repeated daily for at least 3 days to document the evolution of the bite. Because each person has a characteristic bite pattern, a forensic odontologist may be able to match dental models (casts) of a suspected abuser's teeth with impressions or photographs of the bite.

Blood group substances can be secreted in saliva. DNA is present in epithelial cells from the mouth and may be deposited in bites. Even if saliva and cells have dried, they should be collected using the double-swab technique. First, a sterile cotton swab moistened with distilled water is used to wipe the area in question, dried, and placed in a specimen tube. A second sterile dry cotton swab cleans the same area, then is dried and placed in a specimen tube. A third control sample should be obtained from an uninvolved area of the child's skin. All samples should be sent to a certified forensic laboratory for prompt analysis.[30] The chain

of custody must be maintained on all samples submitted for forensic analysis. Questions regarding evidentiary procedure should be directed to a law enforcement agency.

Dental neglect

Dental neglect, as defined by the American Academy of Pediatric Dentistry,[31] is the "willful failure of parent or guardian to seek and follow through with treatment necessary to ensure a level of oral health essential for adequate function and freedom from pain and infection." Dental caries, periodontal diseases, and other oral conditions, if left untreated, can lead to pain, infection, and loss of function. These undesirable outcomes can adversely affect learning, communication, nutrition, and other activities necessary for normal growth and development.[32] Some children who first present for dental care have severe early childhood caries (formerly termed "baby bottle" or "nursing" caries); caregivers with adequate knowledge and willful failure to seek care must be differentiated from caregivers without knowledge or awareness of their child's need for dental care in determining the need to report such cases to child protective services.

Failure to seek or obtain proper dental care may result from factors such as family isolation, lack of finances, parental ignorance, or lack of perceived value of oral health.[33] The point at which to consider a parent negligent and to begin intervention occurs after the parent has been properly alerted by a health care professional about the nature and extent of the child's condition, the specific treatment needed, and the mechanism of accessing that treatment.[33] Because many families face challenges in their attempts to access dental care or insurance for their children, the clinician should determine whether dental services are readily available and accessible to the child when considering whether negligence has occurred.

The physician or dentist should be certain that the care-givers understand the explanation of the disease and its implications and, when barriers to the needed care exist, attempt to assist the families in finding financial aid, transportation, or public facilities for needed services. Parents should be reassured that appropriate analgesic and anesthetic procedures will be used to ensure the child's comfort during dental procedures. If, despite

these efforts, the parents fail to obtain therapy, the case should be reported to the appropriate child protective services agency.[31,33]

Conclusions

Pediatricians should be aware that physical or sexual abuse may result in oral or dental injuries or conditions that sometimes can be confirmed by laboratory findings. Furthermore, injuries inflicted by one's mouth or teeth may leave clues regarding the timing and nature of the injury as well as the identity of the perpetrator. Pediatricians are encouraged to be knowledgeable about such findings and their significance and to meticulously observe and document them. When questions arise or when consultation is needed, a pediatric dentist or a dentist with formal training in forensic odontology can ensure appropriate testing, diagnosis, and treatment.

Pediatric dentists and oral and maxillofacial surgeons, whose advanced education programs include a mandated child abuse curriculum, can provide valuable information and assistance to physicians about oral and dental aspects of child abuse and neglect. The Prevent Abuse and Neglect Through Dental Awareness [also known as PANDA; telephone (501) 661-2595 or e-mail Lmouden@healthyarkansas.com] coalition, which has trained thousands of physicians, nurses, teachers, child care providers, dentists, and dental auxiliaries, is another resource for physicians seeking information on this issue. Physician members of multidisciplinary child abuse and neglect teams are encouraged to identify such dentists in their communities to serve as consultants for these teams. In addition, physicians with experience or expertise in child abuse and neglect can make themselves available to dentists and to dental organizations as consultants and educators. Such efforts will strengthen our ability to prevent and detect child abuse and neglect and enhance our ability to care for and protect children.

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Policy on Hospitalization and Operating Room Access for Dental Care of Infants, Children, Adolescents, and Persons With Special Health Care Needs

Originating Committee
Dental Care Committee

Review Council
Council on Clinical Affairs

Adopted
1989

Revised
1997, 2001, 2005, 2010

Reaffirmed
1993

Purpose

The American Academy of Pediatric Dentistry (AAPD) advocates, when indicated, hospitalization and equal access to operating room facilities for dental care of infants, children, adolescents, and persons with special health care needs. The AAPD recognizes that barriers to hospital dental care for patients best treated in that setting need to be addressed.

Method

This policy is an update of the previous document revised in 2005 ~~based upon a review of current dental literature and policies of dental and medical organizations. A MEDLINE search was performed using the keywords "hospitalization" and "operating room access."~~ An updated electronic search using the search terms "Access to care for dental care in hospitals" , "Operating room access for dental care" was conducted. Fields : All Fields; Limits: within the last ten years. When data did not appear sufficient or were inconclusive, recommendations were made based upon expert and /or consensus opinion by experienced researchers and clinicians.

Background

Pediatric dentists often treat patients who present special challenges related to their age, behavior, medical status, developmental disabilities, intellectual limitations, or special needs. Caries, periodontal diseases, and other oral conditions, if left untreated, can lead to pain, infection, and loss of function.[1-4] These undesirable outcomes adversely can affect learning, communication, nutrition, and other activities necessary for normal growth and development.[5-8] ZMany medical conditions (eg, hematological, oncological) are compounded by the presence of oral maladies and disease. To address these challenges and meet these treatment needs effectively, pediatric dentists have developed and employ a variety of management techniques, including accessing anesthesia services and/or the provision of dental care in a hospital setting with or without general anesthesia. Hospital dentistry is an integral part of the curriculum of all accredited advanced pediatric dental training programs. Pediatric dentists are, by virtue of training and experience, qualified to recognize the indications for such an approach and to render such care.[9-8]

Pediatric dentists occasionally have experienced difficulty in gaining an equal opportunity to schedule operating room time, postponement/delay of nonemergency dental care, and economic credentialing. Economic credentialing (ie, the use of economic criteria not related to quality of care or professional competency) to determine qualifications for granting/renewing an individual's clinical staff membership or privileges should be opposed.[10,11] ~~[9]Additionally, economic credentialing by third party payors in which economic factors are placed above quality of care is unwarranted.[12]~~ The American Academy of Pediatric Dentistry and the American Dental Association urge hospital insurance carriers to include hospitalization benefits for dental treatment in both private and public insurance programs so that the resources of a hospital are available to patients whose condition in the judgment of the dentist warrants treatment in the operating room.[10]

The mutual objective of both the governing board and the medical staff is to improve the quality and efficiency of patient care in the hospital. Decisions regarding hospital privileges should be based upon the training, experience, and demonstrated competence of candidates, taking into consideration the availability of facilities and the overall medical needs of the

community, the hospital, and especially the patients. Privileges should not be based on numbers of patients admitted to the facility or the patient's economic or insurance status.~~13~~11

Policy statement

The AAPD shall work with all concerned medical and dental colleagues and organizations to remove barriers to hospital and operating room access for dental care for patients best treated in ~~that~~ those settings. The AAPD affirms that hospitals or outpatient settings providing surgical treatment should not discriminate against pediatric dental patients requiring care under general anesthesia. Such patients and their care providers need access to these facilities. The dental patient, as with any other patient, should have the right to be seen in a timely manner.

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Policy on Hospital Staff Membership

Originating Committee
Hospital Guidelines for Pediatric Dentistry Ad Hoc Committee

Review Council
Council on Clinical Affairs

Adopted
1977

Revised
1979, 1991, 1999, 2002, 2005, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that dentists have the opportunity to play a significant role within a hospital. Staff membership is necessary to provide comprehensive, consultative, and/or emergency dental services for infants, children, adolescents, and persons with special health care needs within the hospital setting.

Method

This guideline is an update of the previous document, revised in 2005. The update included an electronic search using the search terms, "Hospital Staff" and "Dentistry". Fields: All Fields; Limits: within the last ten years; humans; English; clinical trials. The reviewers agreed 2 articles met the defined criteria. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

~~This policy is based on a review of the 2004 Comprehensive Accreditation Manual for Hospitals: The Official Handbook.[1]~~

Background

Pediatric dentists contribute in multiple ways as members of the hospital staff. Most commonly, the pediatric dentist can provide ~~essential~~ comprehensive dental services to patients within an operating room setting. Additionally, the pediatric dentist can provide

consulting and emergency services.~~2~~ 1 "Team" (eg, cleft lip/palate, hemophilia) evaluations of patients often require dental input, and certain medical protocols (eg, hematopoietic cell transplantation) require an oral examination. Beyond patient services, a pediatric dentist may participate within the hospital's organizational structure through committee memberships of either clinical or administrative purpose. A pediatric dentist can partner with medical colleagues in self-development through hospital-sponsored continuing medical education.

~~Health care providers~~ Pediatric dentists seeking hospital staff membership must contact the medical staff office at an area hospital. Board certification or candidacy (previously known as board eligibility) is increasingly being required for hospital staff membership. Following a credentialing process and appointment to a medical staff, a pediatric dentist must accept and fulfill certain responsibilities. Among them are patient care within the limits of approved clinical privileges, possible participation in emergency department on-call rotations, timely ~~medical records~~ completion of medical records, and compliance with the rules and regulations of the medical/dental staff and the policies and procedures of the hospital.

Although hospital and medical/dental staffs have some individual latitude, the standards for all hospital services are issued by national commissions such as the Joint Commission on Accreditation of Healthcare Organization (JCAHO).~~1~~ 2 Standards for dental services are integrated intimately and inseparably within the overall hospital organizational structure and, therefore, are stringently subject to the standards established by these commissions.

Economic credentialing (ie, the use of economic criteria not related to quality of care or professional competency) to determine qualifications for granting/renewing an individual's clinical staff membership or privileges should be opposed.3 The mutual objective of both the governing board and the medical staff is to improve the quality and efficiency of patient care in the hospital. Decisions regarding hospital privileges should be based upon the training, experience, and demonstrated competence of candidates, taking into consideration the availability of facilities and the overall medical needs of the community, the hospital,

and especially the patients. Privileges should not be based on numbers of patients admitted to the facility or the patient's economic or insurance status.[4]

Policy statement

The AAPD:

1. Encourages the participation of pediatric dentists on hospital medical/dental staffs. Beyond having the capability to provide valuable services to patients, the pediatric dentist can be an effective, contributing member to the hospital through consultative services, educational opportunities, leadership initiatives, and committee membership.
2. Recognizes the American Dental Association as a corporate member of the JCAHO and further recognizes the standards for hospital governance, as established by the JCAHO.
3. Encourages hospital member pediatric dentists to maintain strict adherence to the rules and regulations of the medical/dental staff and the policies and procedures of the hospital.
4. Is opposed to the use of economic credentialing to determine qualifications for granting/renewing an individual's clinical staff membership or privileges should be opposed

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Guideline on Management of Acute Dental Trauma

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2001

Revised
2004, 2007, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) intends these guidelines to define, describe appearances, and set forth objectives for general management of acute traumatic dental injuries rather than recommend specific treatment procedures that have been presented in considerably more detail in textbooks and the dental/medical literature.

Methods

This guideline is an update of the previous document revised in 2007. It is based on a review of the current dental and medical literature related to dental trauma. An electronic ~~MEDLINE~~ search was conducted using the following: ~~t~~Terms: "teeth", "trauma", "permanent teeth", and "primary teeth"; Field: All Fields; Limits: within the last 10 years; humans; English. 5,269 articles matched these criteria. Papers for review were chosen from this list and references within selected articles. ~~Also~~ In addition, a review of the journal *Dental Traumatology* was conducted for the years 2000-200~~6~~9. The recommendations are congruent with the 200~~1~~7 guidelines developed by the International Association of Dental Traumatology.~~1-5~~ 1-3 When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion including those from the 2008 symposium of the AAPD titled "Symposium on Trauma: A Comprehensive Update on Permanent Tooth Trauma in Children" (Chicago, Ill).

Background

Facial trauma that results in fractured, displaced, or lost teeth can have significant negative functional, esthetic, and psychological effects on children.~~6~~ [4, 5] Dentists and physicians should collaborate to educate the public about prevention and treatment of ~~oral~~ traumatic injuries to the oral and maxillofacial region.

The greatest incidence of trauma to ~~the~~ primary ~~dentition~~ teeth occurs at 2 to 3 years of age, when motor coordination is developing.~~7~~ [6] The most common injuries to permanent teeth occur secondary to falls, followed by traffic accidents, violence, and sports.~~8-11~~ [7-10] All sporting activities have an associated risk of orofacial injuries due to falls, collisions, and contact with hard surfaces.~~12~~ [11] The AAPD encourages the use of protective gear, including mouth-guards, which help distribute forces of impact, thereby reducing the risk of severe injury.~~13,14~~ [12, 13]

Dental injuries could have improved outcomes if the public were aware of first-aid measures and the need to seek immediate treatment.~~15-18~~ [14-17] Because optimal treatment results follow immediate assessment and care,~~19~~ [18] dentists have an ethical obligation to ensure that reasonable arrangements for emergency dental care are available.~~20~~ [19] The history, circumstances of the injury, pattern of trauma, and behavior of the child and/or caregiver are important in distinguishing non-abusive injuries from abuse.~~21~~ [20]

Practitioners have the responsibility to recognize, differentiate, and either appropriately manage or refer children with acute oral traumatic injuries, as dictated by the complexity of the injury and the individual clinician's training, knowledge, and experience. Compromised airway, neurological manifestations such as altered orientation, hemorrhage, nausea, vomiting, or suspected loss of consciousness requires further evaluation by a physician.

To efficiently determine the extent of injury and correctly diagnose injuries to the teeth, periodontium, and associated structures, a systematic approach to the traumatized child is essential.~~22,23~~ [21, 22] Assessment includes a thorough medical and dental history, ~~visual~~ clinical and radiographic examination, and additional tests such as palpation, percussion, sensitivity, and mobility evaluation. Intraoral radiography is useful for the evaluation of dentoalveolar trauma. If the area of concern extends beyond the dentoalveolar complex, extraoral imaging may be indicated. Treatment planning takes into consideration the

patient's health status and developmental status as well as extent of injuries. Advanced behavior guidance techniques or an appropriate referral may be necessary to ensure that proper diagnosis and care are given.

All relevant diagnostic information, treatment, and recommended follow-up care are documented in the patient's record. Appendix I is a sample document for recording assessment of acute traumatic injuries. This sample form, developed by the AAPD, is provided as a practice tool for pediatric dentists and other dentists treating children. It was developed by pediatric dentistry experts and offered to facilitate excellence in practice. This form, however, does not establish or evidence a standard of care. In issuing this form, the AAPD is not engaged in rendering legal or other professional advice. If such services are required, competent legal or other professional counsel should be sought. Well-designed follow-up procedures are essential to diagnose complications.

After a primary tooth has been injured, the treatment strategy is dictated by the concern for the safety of the permanent dentition.~~7,22,24~~ 6, 21, 23 If determined that the displaced primary tooth has encroached upon the developing permanent tooth germ, removal is indicated.~~2,7,25-29~~ 3, 6, 24-28 In the primary dentition, the maxillary anterior region is at low risk for space loss unless the avulsion occurs prior to canine eruption or the dentition is crowded.~~24~~ 23 Fixed or removable appliances, while not always necessary, can be fabricated to satisfy parental concerns for esthetics or to return a loss of oral or phonetic function.~~7~~ 6

When an injury to a primary tooth occurs, informing parents about possible pulpal complications, appearance of a vestibular sinus tract, or color change of the crown associated with a sinus tract can help assure timely intervention, minimizing complications for the developing succedaneous teeth.~~2,7,30~~ 3, 6, 29, 30 Also, it is important to caution parents that the primary tooth's displacement may result in any of several permanent tooth complications, including enamel hypoplasia, hypocalcification, crown/root dilacerations, or disruptions in eruption~~s~~ patterns or sequence.~~30~~ 29 The risk of trauma-induced developmental disturbances in the permanent successors is greater in children whose enamel calcification is incomplete.~~24,31~~ 23, 31

The treatment strategy after injury to a permanent tooth is dictated by the concern for vitality of the periodontal ligament and pulp. Subsequent to the initial management of the

dental injury, continued periodic monitoring is indicated to determine clinical and radiographic evidence of successful intervention (ie, asymptomatic, positive sensitivity to pulp testing, root continues to develop in immature teeth, no mobility, no periapical pathology).~~3-5,22,29,32~~ 1, 2, 21, 24, 32 Initiation of endodontic treatment is indicated in cases of spontaneous pain; abnormal response to pulp sensitivity tests; lack of continued root formation or apexogenesis; or breakdown of periradicular supportive tissue.~~3-5,22,29,32~~ 1, 2, 21, 24, 32 To restore a fractured tooth's normal esthetics and function, reattachment of the crown fragment is a~~n~~ good alternative that ~~can~~ should be considered.~~22,29~~ 21, 24, 33

To stabilize a tooth following traumatic injury, a splint may be necessary.~~29,33-37~~ 24, 34-38 Flexible splinting assists in healing.~~22,38~~ 21, 39 Characteristics of the ideal splint include:

1. easily fabricated in the mouth without additional trauma;
2. passive unless orthodontic forces are intended;
3. allows physiologic mobility;
4. nonirritating to soft tissues;
5. does not interfere with occlusion;
6. allows endodontic access and vitality testing;
7. easily cleansed;
8. easily removed.

Instructions to patients having a splint placed include to:

1. consume a soft diet
2. avoid biting on splinted teeth;
3. maintain meticulous oral hygiene;
4. use chlorhexidine/antibiotics as prescribed;
5. call immediately if splint breaks/loosens.

Recommendations

Infraction

Definition: incomplete fracture (crack) of the enamel without loss of tooth structure.

Diagnosis: normal gross anatomic and radiographic appearance; craze lines apparent, especially with transillumination.

Treatment objectives: to maintain structural integrity and pulp vitality.~~29, 39, 40~~ 24, 40, 41

General prognosis: Complications are unusual.~~41~~ 42

Crown fracture–uncomplicated

Definition: an enamel fracture or an enamel-dentin fracture that does not involve the pulp.

Diagnosis: clinical and/or radiographic findings reveal a loss of tooth structure confined to the enamel or to both the enamel and dentin.~~1,3,7,19-22,24-26,32,39,42,43~~ 1, 3, 6, 18-21, 23, 26, 30, 32, 41, 43, 44

Treatment objectives: to maintain pulp vitality and restore normal esthetics and function. Injured lips, tongue, and gingiva should be examined for tooth fragments. Radiographs, including lip and cheek lacerations, are recommended. 1 For small fractures, rough margins and edges can be smoothed. For larger fractures, the lost tooth structure can be restored.~~1,3,7,22,24-26,30,32,39,41-43~~ 1, 3, 6, 21, 23, 26, 29, 30, 32, 41-44

General prognosis: The prognosis of uncomplicated crown fractures depends primarily upon the concomitant injury to the periodontal ligament and secondarily upon the extent of dentin exposed.~~22~~ 21 Optimal treatment results follow timely assessment and care.

Crown fracture–complicated

Definition: an enamel-dentin fracture with pulp exposure.

Diagnosis: clinical and radiographic findings reveal a loss of tooth structure with pulp exposure.~~1,3,7,22~~ 1, 3, 6, 21

Treatment objectives: to maintain pulp vitality and restore normal esthetics and function.~~30~~ 29 Injured lips, tongue, and gingiva should be examined for tooth fragments. Radiographs, including lip and cheek lacerations, are recommended. 1

- Primary teeth: Decisions often are based on life expectancy of the traumatized primary tooth and vitality of the pulpal tissue. Pulpal treatment alternatives are pulpotomy, pulpectomy, and extraction.~~1,7,24-26~~ 3, 6, 23, 26, 30
- Permanent teeth: Pulpal treatment alternatives are direct pulp capping, partial pulpotomy, and pulpectomy (start of root canal therapy).~~3,22,41,44~~ 1, 21, 42, 43 There is increasing evidence to suggest that utilizing conservative vital pulp therapies for

mature teeth with closed apices is as appropriate a management technique as when used for immature teeth with open apices.[45]

General prognosis: The prognosis of crown fractures appears to depend primarily upon a concomitant injury to the periodontal ligament.[~~22~~ 21] The age of the pulp exposure, extent of dentin exposed, and stage of root development at the time of injury secondarily affect the tooth's prognosis.[~~22~~ 21] Optimal treatment results follow timely assessment and care.

Crown/root fracture

Definition: an enamel, dentin, and cementum fracture with or without pulp exposure.

Diagnosis: Clinical findings usually reveal a mobile coronal fragment attached to the gingiva with or without a pulp exposure. Radiographic findings may reveal a radiolucent oblique line that comprises crown and root in a vertical direction in primary teeth and in a direction usually perpendicular to the central radiographic beam in permanent teeth. While radiographic demonstration often is difficult, root fractures can only be diagnosed radiographically.[~~1,3,7,22,29~~ 1, 3, 6, 21, 30]

Treatment objectives: to maintain pulp vitality and restore normal esthetics and function.[~~11~~ 10]

- Primary teeth: When the primary tooth cannot or should not be restored, the entire tooth should be removed unless retrieval of apical fragments may result in damage to the succedaneous tooth.[~~1,7~~ 3, 6]
- Permanent teeth: The emergency treatment objective is to stabilize the coronal fragment. Definitive treatment alternatives are to remove the coronal fragment followed by a supragingival restoration or necessary gingivectomy; osteotomy; or surgical or orthodontic extrusion to prepare for restoration. If the pulp is exposed, pulpal treatment alternatives are pulp capping, pulpotomy, and root canal treatment.[~~3,22,41~~ 1, 21, 42]

General prognosis: Although the treatment of crown-root fractures can be complex and laborious, most fractured permanent teeth can be saved.[~~22~~ 21] Fractures extending significantly below the gingival margin may not be restorable.

Root fracture

Definition: a dentin and cementum fracture involving the pulp.

Diagnosis: Clinical findings reveal a mobile coronal fragment attached to the gingiva that may be displaced. Radiographic findings may reveal 1 or more radiolucent lines that separate the tooth fragments in horizontal fractures. Multiple radiographic exposures at different angulations may be required for diagnosis. A root fracture in a primary tooth may be obscured by a succedaneous tooth.~~1,3,7,22~~ 1, 3, 6, 21

Treatment objectives: to reposition as soon as possible and then to stabilize the coronal fragment in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply, while maintaining esthetic and functional integrity.~~29~~ 24

- Primary teeth: Treatment alternatives include extraction of coronal fragment without insisting on removing apical fragment or observation.~~1,7,24~~ 3, 6, 23 It is not recommended to reposition and stabilize the coronal fragment.3
- Permanent teeth: Reposition and stabilize the coronal fragment.~~3,22~~ 1, 21

General prognosis: Pulp necrosis in root-fractured teeth is attributed to displacement of the coronal fragment and mature root development.~~22,46~~ 21, 46 In permanent teeth, the location of the root fracture has not been shown to affect pulp survival after injury.~~22,47~~ 21, 47 Therefore, preservation of teeth with root fractures occurring in the tooth's cervical third should be attempted.~~22,47~~ 21, 47Young age, immature root formation, positive pulp sensitivity at time of injury, and approximating the dislocation within 1 mm have been found to be advantageous to both pulpal healing and hard tissue repair of the fracture.~~38,47,48~~ 39, 47, 48

Concussion

Definition: Injury to the tooth-supporting structures without abnormal loosening or displacement of the tooth.

Diagnosis: Because the periodontal ligament absorbs the injury and is inflamed, clinical findings reveal a tooth tender to pressure and percussion without mobility, displacement, or sulcular bleeding. Radiographic abnormalities are not expected.~~2,4,7,22,24,32~~ 1, 3, 6, 21, 23, 32

Treatment objectives: to optimize healing of the periodontal ligament and maintain pulp vitality.~~2,4,7,22,24,29,32,49~~ 1, 3, 6, 21, 23, 24, 32, 49

General prognosis: For primary teeth, unless associated infection exists, no pulpal therapy is indicated.~~7~~ [6] Although there is a minimal risk for pulp necrosis, mature permanent teeth with closed apices may undergo pulpal necrosis due to associated injuries to the blood vessels at the apex and, therefore, must be followed carefully.~~22~~ [21]

Subluxation

Definition: injury to tooth-supporting structures with abnormal loosening but without tooth displacement.

Diagnosis: Because the periodontal ligament attempts to absorb the injury, clinical findings reveal a mobile tooth without displacement that may or may not have sulcular bleeding. Radiographic abnormalities are not expected.~~2,4,7,22~~ [1, 3, 6, 21]

Treatment objectives: to optimize healing of the periodontal ligament and neurovascular supply.~~2,4,7,22,24-29,32,49~~ [1, 3, 6, 21, 23, 24, 26-28, 30, 32, 49]

- Primary teeth: The tooth should be followed for pathology.
- Permanent teeth: Stabilize the tooth and relieve any occlusal interferences. For comfort, a flexible splint can be used. Splint for no more than 2 weeks.

General prognosis: Prognosis is usually favorable.~~24,32~~ [23, 32] The primary tooth should return to normal within 2 weeks.~~7~~ [6]Mature permanent teeth with closed apices may undergo pulpal necrosis due to associated injuries to the blood vessels at the apex and, therefore, must be followed carefully.~~22~~ [21]

Lateral luxation

Definition: displacement of the tooth in a direction other than axially. The periodontal ligament is torn and contusion or fracture of the supporting alveolar bone occurs.~~24,32,50~~ [23, 32, 50]

Diagnosis: Clinical findings reveal that a tooth is displaced laterally with the crown usually in a palatal or lingual direction and may be locked firmly into this new position. The tooth usually is not mobile or tender to touch. Radiographic findings reveal an increase in periodontal ligament space and displacement of apex toward or though the labial bone plate.~~2,4,7,22,50~~ [1, 3, 6, 21, 50]

Treatment objectives:

- Primary teeth: to allow passive or spontaneous repositioning if there is no occlusal interference.[3] When there is occlusal interference, the tooth can be gently reposition~~ing~~ed or slightly reduced if the interference is minor.[3] ~~actively reposition and splint for 1 to 2 weeks as indicated to allow for healing, except~~ ~~w~~When the injury is severe or the tooth is nearing exfoliation, extraction is the treatment of choice.~~2,7,25-29~~ 3, 6, 24, 26-28, 30
- Permanent teeth: to reposition as soon as possible and then to stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply, while maintaining esthetic and functional integrity. Repositioning of the tooth is done with digital pressure and little force. ~~The~~ A displaced tooth may need to be extruded to free itself from the apical lock in the cortical bone plate. Splinting an additional 2 to 4 weeks may be needed with breakdown of marginal bone.~~4,22,29,49,50~~ 1, 21, 24, 49, 50

General prognosis: Primary teeth requiring repositioning have an increased risk of developing pulp necrosis compared to teeth that are left to spontaneously reposition.~~7~~ 6 In mature permanent teeth with closed apices, pulp necrosis and pulp canal obliteration are common healing complications while progressive root resorption is less likely to occur.~~50~~ 50

Intrusion

Definition: apical displacement of tooth into the alveolar bone. The tooth is driven into the socket, compressing the periodontal ligament and commonly causes a crushing fracture of the alveolar socket.~~24,32,51~~ 23, 32, 51

Diagnosis: Clinical findings reveal that the tooth appears to be shortened or, in severe cases, it may appear missing. The tooth's apex usually is displaced labially toward or through the labial bone plate in primary teeth and driven into the alveolar process in permanent teeth. The tooth is not mobile or tender to touch. Radiographic findings reveal that the tooth appears displaced apically and the periodontal ligament space is not continuous. Determination of the relationship of an intruded primary tooth with the follicle of the succedaneous tooth is mandatory. If the apex is displaced labially, the apical tip can be seen

radiographically with the tooth appearing shorter than its contralateral. If the apex is displaced palatally towards the permanent tooth germ, the apical tip cannot be seen radiographically and the tooth appears elongated. An extraoral lateral radiograph also can be used to detect displacement of the apex toward or though the labial bone plate. An intruded young permanent tooth may mimic an erupting tooth.~~2,4,7,22,51~~ 1, 3, 6, 21, 51

Treatment objectives:

- Primary teeth: to allow spontaneous re-eruption except when displaced into the developing successor. Extraction is indicated when the apex is displaced toward the permanent tooth germ.~~2,7,25-29~~ 3, 6, 24, 26-28, 30
- Permanent teeth: For immature teeth with more eruptive potential (root 1/2 to 2/3 formed), allow to reposition passively (allowing re-eruption to its preinjury position), actively (repositioning with traction), or surgically and then ~~to~~ stabilize the tooth with a splint for up to 4 weeks in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity. In teeth with immature root formation, the objective is to allow for spontaneous eruption. In mature teeth, the goal is to reposition the tooth with orthodontic or surgical extrusion and initiate endodontic treatment within the first 3 weeks of the traumatic incidence.~~4,22,29,49,51~~ 1, 21, 24, 49, 51

General prognosis: In primary teeth, 90% of intruded teeth will reerupt spontaneously (either partially or completely) in 2 to 6 months.~~24,52~~ 23, 52 Even in cases of complete intrusion and displacement of primary teeth through the labial bone plate, a retrospective study showed the re-eruption and survival of most teeth for more than 36 months.~~53~~ 53 Ankylosis may occur, however, if the periodontal ligament of the affected tooth was severely damaged, thereby delaying or altering the eruption of the permanent successor.~~7~~ 6 In mature permanent teeth with closed apices, there is considerable risk for pulp necrosis, pulp canal obliteration, and progressive root resorption.~~51~~ 51 Immature permanent teeth that are allowed to reposition spontaneously demonstrate the lowest risk for healing complications.~~54,55~~ 54, 55 Extent of intrusion (7mm or greater) and adjacent intruded teeth have a negative influence on healing.~~54~~ 54

Extrusion

Definition: partial displacement of the tooth axially from the socket; partial avulsion. The periodontal ligament usually is torn.~~24,32,56~~ 23, 32, 56

Diagnosis: Clinical findings reveal that the tooth appears elongated and is mobile. Radiographic findings reveal an increased periodontal ligament space apically.~~2,4,7,22,56~~ 1, 3, 6, 21, 56

Treatment objectives:

- Primary teeth: to allow tooth to reposition spontaneously or reposition and allow for healing for minor extrusion (<3mm) in an immature developing tooth. ~~, except when there are i~~ Indications for an extraction ~~(ie, the injury is~~ include severe extrusion or mobility, ~~or~~ the tooth is nearing exfoliation, the child's inability to cope with the emergency situation, or when the primary tooth is fully formed~~)~~. ~~If the treatment decision is to reposition and stabilize, splint for 1 to 2 weeks.~~~~2,7,24-29~~ 6, 23, 24, 26-28, 30, 57
- Permanent teeth: to reposition as soon as possible and then to stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity. Repositioning may be accomplished with slow and steady apical pressure to gradually displace coagulum formed between root apex and floor of the socket. Splint for up to ~~3~~ 2 weeks.~~4,22,29,49,56~~ 1, 21, 24, 49, 56

General prognosis: There is a lack of clinical studies evaluating repositioning of extruded primary teeth.~~7~~ 6 In permanent mature teeth with closed apices, there is considerable risk for pulp necrosis and pulp canal obliteration.~~56~~ 56 These teeth must be followed carefully.~~4,22~~ 1, 21

Avulsion

Definition: complete displacement of tooth out of socket. The periodontal ligament is severed and fracture of the alveolus may occur.~~24,32~~ 23, 32

Diagnosis: Clinical and radiographic findings reveal that the tooth is not present in the socket or the tooth already has been replanted. Radiographic assessment will verify that the tooth is not intruded when the tooth was not found.~~2,7,22,24,32~~ 1, 3, 6, 21, 23, 32

Treatment objectives:

- Primary teeth: to prevent further injury to the developing successor. Avulsed primary teeth should not be replanted because of the potential for subsequent damage to developing permanent tooth germs.~~2,7,22,24,28,29~~ 3, 6, 21, 23, 24, 27
- Permanent teeth: to replant as soon as possible and then to stabilize the replanted tooth in its anatomically correct location to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity except when replanting is contraindicated by:

1. the child's stage of dental development (risk for ankylosis where considerable alveolar growth has to take place);
2. compromising medical condition; or
3. compromised integrity of the avulsed tooth or supporting tissues. Flexible splinting for ~~1~~ 2 weeks is indicated.~~5~~ 2 Tetanus prophylaxis and antibiotic coverage should be considered.~~5,22,29,57,63~~ 2, 21, 24, 58, 59 Treatment strategies are directed at avoiding inflammation that may occur as a result of the tooth's attachment damage and/or pulpal infection.~~64,65~~ 60, 61

General prognosis: Prognosis in the permanent dentition is primarily dependent upon formation of root development and extraoral dry time.~~5,22~~ 2, 21 The tooth has the best prognosis if replanted immediately.~~29,64~~ 24, 61 If the tooth cannot be replanted within 5 minutes, it should be stored in a medium that will help maintain vitality of the periodontal ligament fibers.~~30,66~~ 29, 62

The best ~~T~~transportation media (physiologic) for avulsed teeth ~~include~~ are ~~(in order of preference)~~ Viaspan™, Hank's Balanced Salt Solution (tissue culture medium), and cold milk.,~~57,61-63,67~~ 58, 59, 63-65 Next best would be a non-physiologic media such as saliva (buccal vestibule), physiologic saline, or water.~~57,61-63,67~~ 58, 59, 63-65 Although water is detrimental to cell viability due to its low osmolality and long term storage in water (ie more than 20 minutes) has an adverse effect on periodontal ligament healing, it is a better choice than dry

storage. [24] Limited tooth storage in a cell-compatible medium prior to replantation has produced similar healing results as compared with immediately-replanted teeth.~~[68]~~ [66] The risk of ankylosis increases significantly with an extraoral dry time of ~~15~~ 20 minutes.~~[30,69]~~ [29, 62, 67, 68] An extraoral dry time of 60 minutes is considered the point where survival of the root periodontal cells is unlikely.~~[64]~~ [61] In permanent avulsed teeth, there is considerable risk for pulp necrosis, root resorption, and ankylosis. ~~, and subsequent infraocclusion during adolescent growth.~~[61,70,71] [63, 69, 70]

Additional considerations: Recent evidence suggests that success of replantation is dependent upon many factors, some of which the clinician can manipulate in a manner that favors more successful outcomes. The Decision Trees in Figures 1 and 2 offer the most up-to-date information in an easy-to-use flow-chart format.[60]

Revascularization: An immature or open apex tooth has the potential to establish revascularization when there is a minimum of a 1.0 mm apical opening.[71] Complete pulpal revascularization has been shown to occur at a rate of 18% among immature teeth.[72] It appears that antibiotic treatment reduces contamination of the root surface and / or pulp space, thereby creating a biological environment that aids revascularization. [73] On the other hand, a mature tooth or closed apex tooth (apex opening < 1.0 mm) has little or no chance of revascularization. Researchers have demonstrated that immature teeth soaked in doxycycline solution have a greater rate of pulp revascularization.[73, 74]

PDL Management – Transitional Therapy: When a tooth has been out of the oral cavity and in a dry environment for greater than 60 minutes, the PDL has no chance of survival. If such a tooth is replanted, it is likely to undergo osseous replacement resorption and over time, the tooth will become ankylosed and will ultimately be lost.[75] Because pediatric dentists need to consider the growth and development of the child patient, the goal for a tooth that has been avulsed for greater than 60 minutes with dry storage is to delay the osseous replacement and hence, ankylotic process as long as possible. To slow down this process, the remaining PDL should be removed because otherwise it becomes a stimulus for inflammation that accelerates infection-related resorption. The remaining PDL can be removed by several methods: gentle scaling and root planning, soft pumice prophy, gauze or by soaking the tooth in 3% citric acid for 3 minutes.[74, 76] This should be followed by a

sodium fluoride treatment for 20 minutes. The rationale for this fluoride soak is based on evidence that this procedure will delay but not prevent ankylosis. Despite these recommendations, teeth that have been out of the oral cavity for greater than 60 minutes with dry storage have a poor prognosis and will not survive long-term; however, when teeth are soaked in fluoride before replantation, it has been shown to significantly reduce the risk of resorption after a follow-up of five years.[77]

Possible contraindications to replanting: There are possible contraindications to tooth replantation. Examples are immunocompromised health, severe congenital cardiac anomalies, severe uncontrolled seizure disorder, severe mental disability, severe uncontrolled diabetes, and lack of alveolar integrity.

Current Research

Antiresorptive-regenerative therapies may have potential for enhancing the prognosis of avulsed teeth.[~~68~~ 66] Treatment strategies are directed at avoiding or minimizing inflammation, increasing revascularization, and producing hard barriers in teeth with open apices.[~~5,64,72-81~~ 2, 61, 73, 78-86] New treatment strategies are also directed at specific clinical challenges that include decoronation as an approach to treat ankylosis in growing children and transplantation of premolars as an approach for replacing avulsed teeth.[87, 88] Dental practitioners should follow current literature and consider carefully evidenced-based recommendations that may enhance periodontal healing and revascularization of avulsed permanent teeth.

Orthodontic Movement of Traumatized Teeth

Teeth that have been traumatized must be evaluated carefully prior to beginning or continuing orthodontic movement. Even with more simple crown / root fractures without pulpal involvement, a 3 month wait is recommended before tooth movement should begin. Other minor trauma to the tooth and periodontium such as minor concussions, subluxations, and extrusions also require a 3 month rest. When there has been moderate to severe trauma / damage to the periodontium, a minimum of 6 months wait is recommended.[89, 90] Teeth that have sustained root fractures cannot be moved for at least one year.[89, 90] Where there is radiographic evidence of healing, these teeth can be successfully

moved.[91] In teeth that require endodontics, movement can begin once healing is evident.[89, 90]

Since teeth that have sustained severe periodontal injury have been found to undergo pulp necrosis when orthodontic movement was initiated even after a rest period,[92, 93] light intermittent forces are recommended along with avoidance of prolonged tipping forces and contact with the buccal or lingual cortical plates.[90]

The use of a mouthguard during fixed appliance therapy is recommended. Studies have found the most effective are a modified custom mouthguard.[94, 95] The newer stock ortho-channel mouthguards may be more convenient but there are no studies to date on their effectiveness.[94]

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Fig 1: Clinical Management of Avulsed Permanent Incisors with an Open Apex

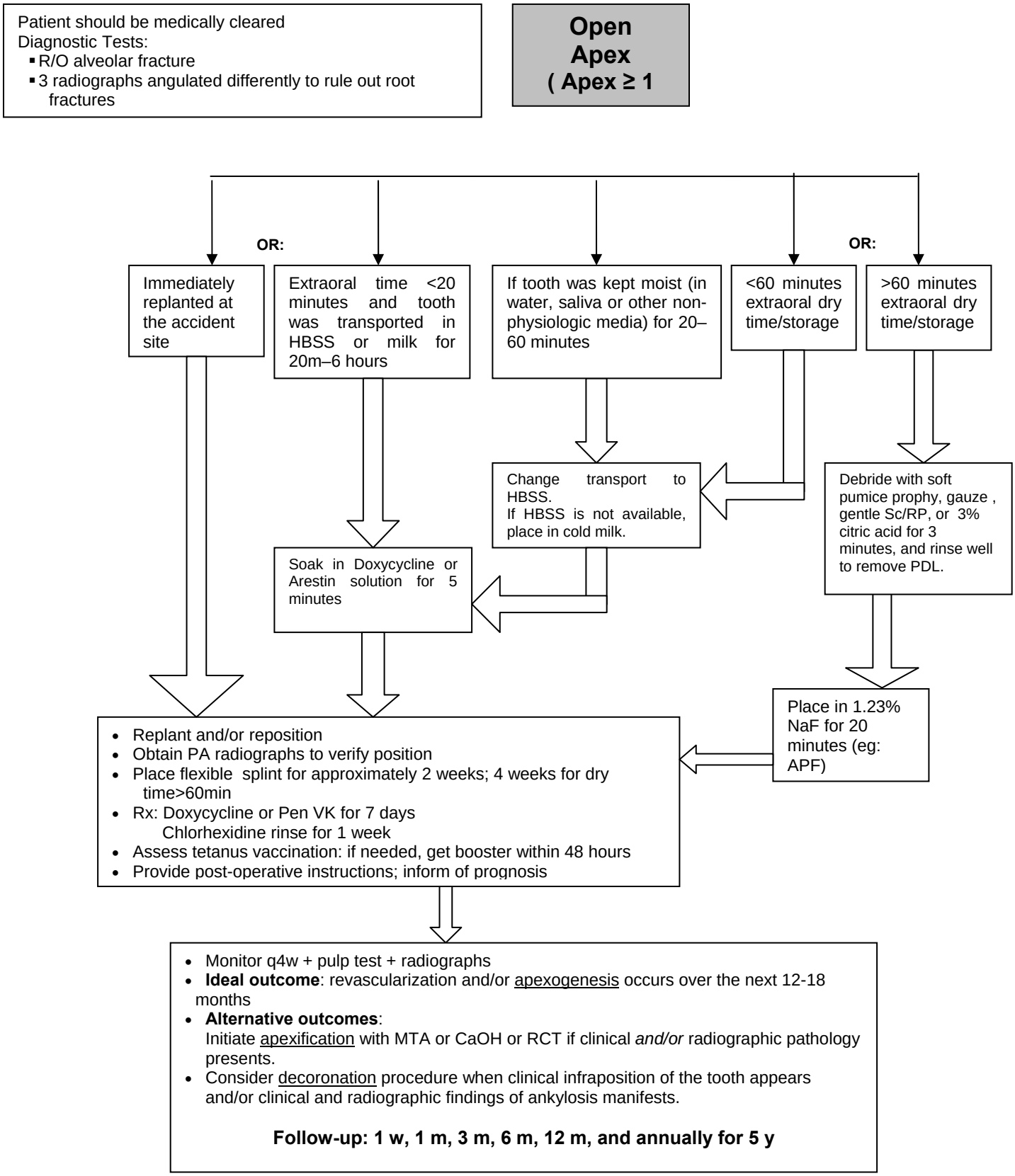
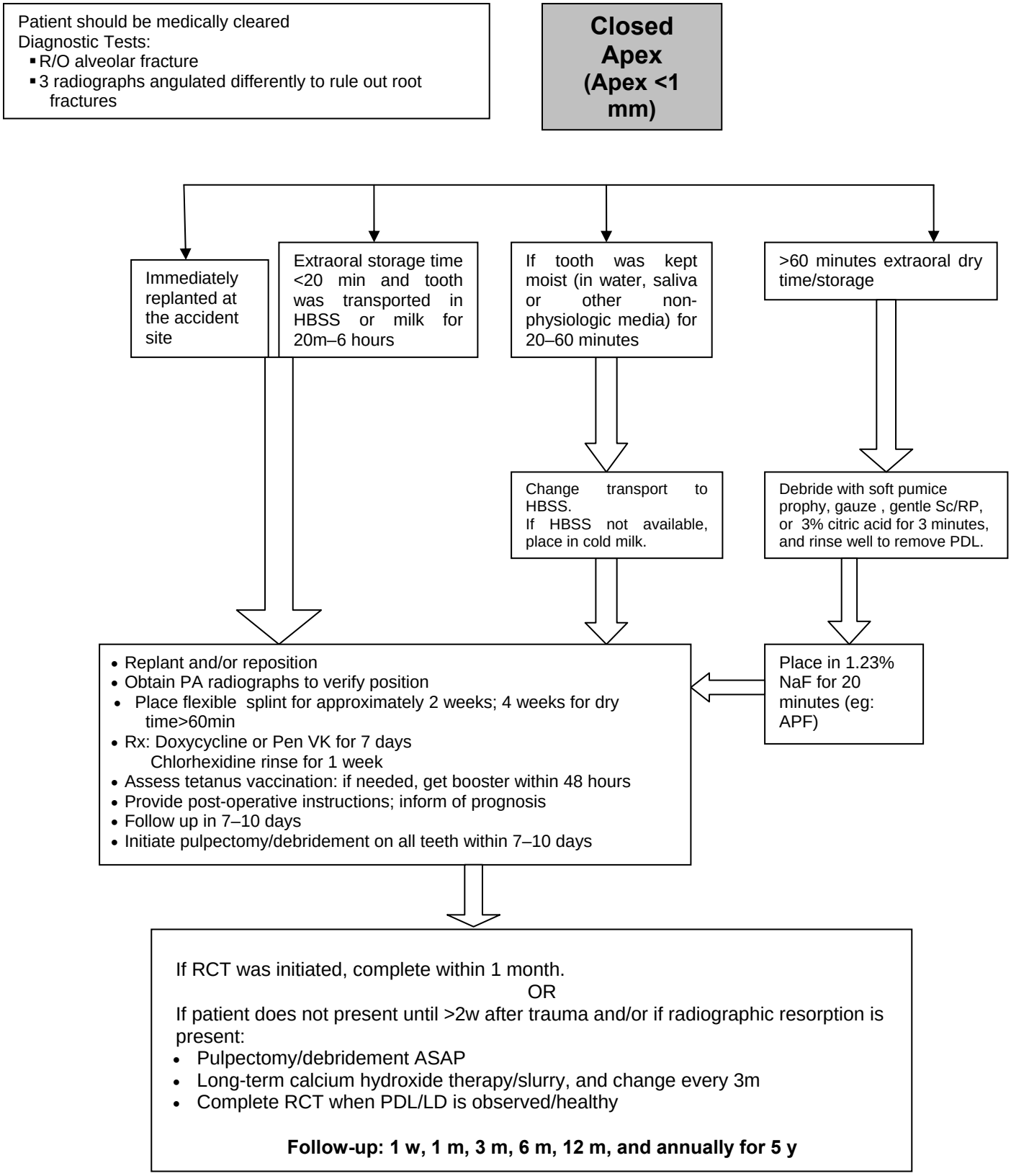


Fig 2: Clinical Management of Avulsed Permanent Incisors with a Closed Apex



Definition of Dental Neglect

Originating Committee
Child Abuse Committee

Review Council
Council on Clinical Affairs

Adopted
1983

Revised
1987, 1992

Reaffirmed
1996, 2001, 2006, 2010

Dental caries, periodontal diseases, and other oral conditions, if left untreated, can lead to pain, infection, and loss of function. These undesirable outcomes can adversely affect learning, communication, nutrition, and other activities necessary for normal growth and development.

Dental neglect is willful failure of parent or guardian to seek and follow through with treatment necessary to ensure a level of oral heath essential for adequate function and freedom from pain and infection.

Guideline on Acquired Temporomandibular Disorders in Infants, Children, and Adolescents

Originating Committee
Clinical Affairs Committee – Temporomandibular Joint Problems in Children Subcommittee
Review Council
Council on Clinical Affairs
Adopted
1990
Revised
1999, 2002, 2006, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that disorders of the temporomandibular joint (TMJ) occasionally occur in infants, children, and adolescents. This guideline is intended to assist the practitioner in the recognition and diagnosis of temporomandibular disorders (TMD) and to identify possible treatment options. It is beyond the scope of this document to recommend the use of specific treatment modalities.

Methods

This guideline ~~was developed following the AAPD's 1989 symposium on TMD in children and adolescents.[1]~~ is an update of the previous document, revised in 2006. ~~This revision is based upon a review of current dental and medical literature related to TMD in children and adolescents. A MEDLINE search was conducted using the terms "temporomandibular disorder", "adolescent", and "children".~~ The update included an electronic search using the search terms "temporomandibular disorders", "TMJ dysfunction", "TMD and adolescents", "TMD and gender differences", "TMD and occlusion", and "TMD and treatment". Fields: All Fields; Limits: Recent literature was limited to within the last fifteen years; humans; English; clinical trials. The reviewers agreed upon the inclusion of sixty-seven articles that met the defined criteria. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background

Development of the TMJ

Function influences form as development and growth of the TMJ proceeds. The TMJ is comprised of three major components: the mandibular condyle, the mandibular fossa, and the associated connective tissue (including the articular disk).[1] The first evidence of development of the TMJ in humans is seen at 8 weeks after conception.[2] During the first decade of life, the mandibular condyle becomes less vascularized and most of the major morphological changes are completed. The shape of the mandibular condyle may change significantly during growth with approximately 5% undergoing radiographic changes in shape between 12-16 years of age.[3] During the second decade of life, there is continued but progressive slowing of growth. From adolescence to adulthood, the condyle changes in length and width going from a more rounded form to a form that is greater in width than length. Although the TMJ experiences active growth in the first two decades, it undergoes adaptive and remodeling changes throughout life.

Definition of TMD

Temporomandibular disorder is a term adopted by the American Dental Association in 1983 to facilitate coordination of research and communication.[4] Okeson defines TMD as "functional disturbances of the masticatory system."[5] Sessle et al., included masticatory muscle disorders, degenerative and inflammatory TMJ disorders and TMJ disk displacements under the umbrella of TMD.[6] Certain medical conditions are reported to occasionally mimic TMD. Among them are trigeminal neuralgia, central nervous system lesions, odontogenic pain, sinus pain, otological pain, developmental abnormalities, neoplasias, parotid diseases, vascular diseases, myofascial pain, cervical muscle dysfunction, and Eagle's syndrome. Other common medical conditions (eg, otitis media, allergies, airway congestion, rheumatoid arthritis) can cause symptoms similar to TMD.[7]

Etiology of TMD

Temporomandibular disorders have multiple etiological factors.[8] In fact, the TMJ and masticatory system is complex and thus requires a thorough understanding of the anatomy

and physiology of the structural, vascular and neurological components in order to treat TMD. Many studies show a poor correlation between any single etiological factor and resulting signs and symptoms.[8] Alterations in any one or a combination of teeth, periodontal ligament, the TMJ or the muscles of mastication can eventually lead to TMD.[9] Research is insufficient to predict reliably which patient will or will not develop TMD. Etiologic factors suggested as contributing to the development of TMD are:

1. ~~Head and neck trauma~~ Trauma: Impact injuries such as trauma to the chin. As a common occurrence in childhood because of a fall, chin trauma is reported to be a factor in the development of TMD in pediatric patients.[10-12] Unilateral and bilateral intracapsular or subcondylar fractures are the most common mandibular fractures in children.[18] Closed reduction and prolonged immobilization can result in ankylosis.[14,15]
2. Occlusal factors: There is a relatively low association of occlusal factors and the development of temporomandibular disorders.[16,17] However, several occlusal features characterize malocclusions:
   - skeletal anterior open bite; [18]
   - overjet greater than 6 to 7 mm; [18-21]
   - retrocuspal position (centric relation) to intercuspal position (centric occlusion) with slides greater than 4 mm;[22]
   - unilateral posterior ~~lingual~~ cross bite; [18,23]
   - 5 or more missing posterior teeth;[24,25]
   - Class III malocclusion.[26]
3. Parafunctional habits: Bruxism, clenching, hyperextension, and any other repetitive habitual behavior. Bruxism is thought to contribute to the development of TMD by joint overloading that leads to cartilage breakdown, synovial fluid alterations and other changes within the joint. These parafunctional habits may occur while the patient is asleep or awake. A study of 854 patients less than 17 years old found the prevalence of bruxism to be 38%.[27] The literature on the association between parafunction and TMD in pediatric patients is contradictory.[28-30] However, childhood parafunction was found to be a predictor of the same parafunction 20 years later.[31] Others found correlations between reported bruxism and TMD[32] with a 3.4 odds ratio [33] and that 1 in 5 bruxers

report orofacial pain. Children who grind their teeth were found to complain more often of pain and muscle tenderness when eating.[34] ~~The literature on the association between parafunction and TMD in pediatric patients is contradictory.[23]~~

4. Posture: Craniocervical posture has been associated with occlusion and with dysfunction of the TMJ, including abnormalities of the mandibular fossa, condyle, ramus, and disc.[35-37]
5. Changes in "free-way" dimension of the rest position: Normally 2-4 mm. May be impinged by occlusal changes, disease, muscle spasms, nervous tension, and/or restorative prosthestics.[9]
6. Orthodontic treatment: Current literature does not support that the development of TMD is caused by orthodontic treatment.[19,38-41] regardless of whether premolars were extracted prior to treatment.[44]

Prevalence of TMD in children and adolescents

The reported prevalence of TMD in infants, children, and adolescents varies widely in the literature.[42-45] Prevalence of signs and symptoms increases with age. One study of the primary dentition reported 34% with signs and/or symptoms of TMD.[46] An epidemiological study of 4724 children aged 5-17 years resported 25% with symptoms. Clicking was seen in 2.7% of children in the primary dentition and increased to 10.1% in late mixed dentition and further increased to 16.6% in patients with permanent dentition.[18] A similar study in preschool children found TMJ sounds and clicking in 16.6% of the patients.[47] A study of 217 adolescents found that over 20% had either signs and/or symptoms of dysfunction; muscular tenderness exhibited wide variability whereas ~~An epidemiological study of 440 children aged 7-14 reported 36% with symptoms (15% of those having recurrent headaches and 13% clicking sounds).[12] More than half of the children (64%) claimed pain upon palpation of the TMJ muscles.[12] In a study of 285 17 year-olds, 62% had either signs or symptoms of dysfunction, with fatigue in the jaw,~~ TMJ sounds, and headache ~~tenderness in the lateral pterygoid muscle as~~ were the most common findings.[48] Clicking is seen more frequently than either locking or luxation and affected girls more than boys. In general, the prevalence of signs and symptoms of TMD are lower in children compared to adults and are

even less the younger the child but increase with increasing age.[23] Recent surveys have indicated that significantly higher prevalence of symptoms and greater need for treatment in girls than boys [43] with the development of symptomatic TMD correlated with the onset of puberty in girls.[49,50]

Controversy surrounds the significance of signs and symptoms in this age group, the value of certain diagnostic procedures, and what constitutes effective therapy. It is not clear whether these signs and symptoms constitute normal variation, preclinical features, or manifestations of a disease state. Whether these signs and symptoms warrant treatment as predictors of TMD in adulthood is questionable.[31]

Recommendations

Diagnosis of TMD

All comprehensive dental examinations should include a screening evaluation of the temporomandibular joint (TMJ) and surrounding area.[51-53] Diagnosis of TMD is based upon a combination of historical information, clinical examination, and/or craniocervical and TMJ imaging.[54,55] The findings are classified as symptoms (those reported by the child or parent) and signs (those identified by the dentist during the examination).[51]

For a positive diagnosis of TMD, patients must have a positive history of facial pain combined with positive physical finding, supplemented by radiographic or imaging data when indicated.[56]

A screening history, as part of the health history may include questions such as:[57]

- Do you have difficulty opening your mouth?
- Do you hear noises within your jaw joint?
- Do you have pain in or around your ears or your cheeks?
- Do you have pain when chewing?
- Do you have pain when opening your mouth wide or when yawning?
- Has your "bite" felt uncomfortable or unusual?
- Does your jaw ever "lock" or "go out"?
- Have you ever had an injury to your jaw, head or neck? If so, when? How was it treated?

- Have you previously been treated for a temporomandibular disorder? If so, when? How was it treated?

Clinical and physical assessment of the TMJ may include: [21]

- Manual palpation of the muscles and TMJ: to evaluate for tenderness of intraoral and extraoral jaw muscles, neck muscles and TMJ capsule;
- Evaluation of jaw movements including mandibular range of motion assessment using a millimeter ruler: 1) maximum unassisted opening, 2) maximum assisted opening, 3) maximum lateral excursion, and 4) maximum protrusive excursion. 5) mandibular opening pattern—is it symmetrical? Restricted manibular opening combined with or without pain on mandibular movement may be interpreted as signs of TMJ internal derangement.[58]
- Determination of TMJ sounds by palpation and auscultation with a stethoscope
- Radiographs (panoramic and full mouth), TMJ tomography, MRI, lateral cephalometric X rays to examine for TMJ pathology and/or dental pathology. TMJ arthography is not recommended as a routine diagnostic procedure.[4,57]

Evaluation of pyscholgical etiologies

As some mental disorders can greatly influence a patient's pain experience, psychosocial factors related to temporomandibular symptoms should be considered including: mood disorders, anxiety disorders, musculoskeletal problems, migraine headaches, tension headaches, emotional factors, ulcers, colitis, occupational factors, and developmental/acquired craniofacial anomalies.[9]

Differential Diagnosis of TMD

There is a need for improved classification of TMDs, however they can largely be grouped into three classes:

1. Disorders of the muscles of mastication (including protective muscle splinting, muscle spasm, and muscle inflammation)
2. Disorders of the TMJ(including internal disk derangement, disk displacement with reduction accompanied by clicking, and anterior disk displacement without reduction seen as mechanical restriction or closed lock)

3. Disorders in other related areas that may mimic TMD such as chronic mandibular hypomobility, inflammatory joint disorders such as juvenile rheumatoid arthritis, degenerative joint disease, extrinsic trauma such as fracture.[4]

Treatment of TMD

Few studies document success or failure of specific treatment modalities for TMD in infants, children, and adolescents on a long-term basis. They suggest that simple, conservative, and reversible types of therapy are effective in reducing most TMD symptoms in children.[59, 64] The goal of treatment should be to find a balance between active and passive modalities. Active modalities include participation of the patient whereas passive modalities may include wearing a stabilization splint. The most common form of treatment of TMD in children was information combined with occlusal appliance therapy.[60] It has been shown that combined treatment approaches are more successful at treating TMD than single treatment modalities.[60,61] Treatment of TMD can be divided into reversible treatment and irreversible.

Reversible therapies include:

- Patient education: This may include relaxation training, developing behavior coping strategies, modifying inadequate perceptions about TMD; patient awareness of clenching and bruxing habits, if present [57]
- Physical therapy: Jaw exercises or transcutaneous electrical nerve stimulation (TENS), ultrasound, iontophoresis, massage, thermotherapy and coolant therapy [5,62,63]
- Behavioral therapy: ~~(eg, eliminating chewing gum)~~avoiding excessive chewing of hard foods or gum; decreasing stress, anxiety and/or depression; voluntary avoidance of stressors and habit reversal [64]
- Prescription medications: Non-steroidal anti-inflammatory drugs, anxiolytic agents, or muscle relaxers. Anti-depressants have proved to be beneficial, however should be prescribed by a physician.[65]
- Occlusal splints: The goal of an occlusal appliance is to provide orthopedic stability to the TMJ. These alter the patient's occlusion temporarily and may be used to decrease parafunctional activity.[60,66,67]

Irreversible therapies can include:

- Occlusal adjustment: This permanently alters the occlusion or mandibular position by selective grinding or full mouth restorative dentistry
- Mandibular repositioning: This is designed to alter the growth or permanently reposition the mandible. Examples are headgear and functional appliances.
- Orthodontics

Referral to other specialists: TMD specialists, oral surgeons, pain specialists

Recommendations

Every comprehensive dental history and examination should include a TMJ history and assessment. The history should include questions concerning the presence of head and neck pain and mandibular dysfunction, previous orofacial trauma, and history of present illness with an account of current symptoms. In the presence of a positive history and/or signs and symptoms of TMD, additional information is suggested and a referral may be considered. A more comprehensive exam should be done. ~~The~~ This examination ~~should~~ may include palpation of masticatory and associated muscles and the TMJ's, documentation of joint sounds, occlusal analysis, and assessment of range of mandibular movements including maximum opening, protrusion, and lateral excursions.

Joint imaging ~~is indicated on a selected basis~~ may be recommended by other specialists to investigate for joint sounds in the absence of other TMD signs and symptoms. For example, the presence of crepitus may indicate degenerative change that is not yet painful.

Therapeutic modalities to prevent TMD in the pediatric population are yet to be supported by controlled studies. For children and adolescents with signs and symptoms of TMD, reversible therapies should be considered. Because of inadequate data regarding their usefulness, irreversible therapies should be avoided.[59,67]

Referral to a medical specialist may be indicated when otitis media, allergies, abnormal posture, airway congestion, rheumatoid arthritis, or other medical conditions are present or suspected.[57]

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Policy on the Use of Xylitol in Caries Prevention

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted 2006
Revised 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes the benefits of caries preventive strategies involving sugar substitutes, particularly xylitol, on the oral health of infants, children, adolescents, and persons with special health care needs. This policy is intended to assist oral health care professionals make informed decisions about the use of xylitol-based products in caries prevention.

Methods

~~A MEDLINE literature search was conducted using the terms "xylitol AND dental caries", "caries prevention", "plaque reduction", "maternal *Streptococcus mutans* (MS) transmission", and "*Streptococcus mutans* long term suppression with xylitol".~~

This policy is an update of the previous policy, adopted in 2006. The update is based upon a review of current dental and medical literature related to the use of xylitol in caries prevention. A MEDLINE search was conducted using PUBMED with the following: TERMS: "xylitol", "caries prevention" ; FIELD: All Fields; LIMITS: within the last 10 years; humans; English; birth through 18. 240 of articles matched these criteria. 25 papers were reviewed at this revision. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background

Xylitol is a five-carbon sugar alcohol derived primarily from forest and agricultural materials. It has been used since the early 1960's in infusion therapy for post-operative,

burn, and shock patients; in the diet of diabetic patients; and, most recently, as a sweetener in products aimed at improved oral health.[1] Dental benefits of xylitol first were recognized in Finland in 1970, using animal models.[2] The first chewing gum developed with the aim of reducing caries and improving oral health was released in Finland in 1975 and in the United States shortly after. The first xylitol studies in humans, known as the Turku Sugar Studies,[3,4] demonstrated the relationship between dental plaque and xylitol, as well as the safety of xylitol for human consumption. These early studies showed the decayed, missing, and filled (dmf) incidence in teeth in a sucrose chewing-gum group was 2.92 compared to 1.04 in the xylitol gum group. The most comprehensive study with xylitol gum, conducted in 1995, compared the effect on caries incidence for xylitol, sorbitol, and sucrose consumption.[5] The group that received 100% xylitol gum 5 times/day had significantly lower levels of sucrose and free sialic acid in whole saliva than at baseline, and significantly lower plaque index scores.[5] The xylitol group also exhibited the lowest levels of salivary lactobacilli at endpoint, and this group did not experience the age-related increase in MS as did the other groups.[5]

Xylitol studies show varying results in the reduction of the incidence of caries or MS levels.[5-11~~13~~] Studies suggest xylitol intake that consistently produces positive results ranged from 4-10 grams per day divided into 3 to 7 consumption periods.[5-11~~13~~] Higher amounts did not result in greater reduction in incidence of caries and may lead to diminishing anticariogenic results.[5-11~~13~~] Similarly, consumption frequency of less than 3 times per day at optimal xylitol amount showed no effect.[12-14~~14-16~~] Abdominal distress and osmotic diarrhea have been reported following the ingestion of xylitol.[15-16~~17-18~~] Diarrhea has been reported in patients who have consumed 3-60 grams of xylitol per day.[17-21 ~~19-23~~]

Xylitol reduces plaque formation and bacterial adherence (ie, is antimicrobial), inhibits enamel demineralization (ie, reduces acid production), and has a direct inhibitory effect on MS. Prolonged use of xylitol appears to select for a "xylitol-resistant" mutant of the MS cells.[22 ~~24~~] These mutants appear to shed more easily into saliva than the parent strains,[23 ~~25~~] resulting in a reduction of MS in plaque[24 ~~26~~] and possibly hampering their transmission/colonization from mother to child. Long-lasting effects have been demonstrated up to 5 years after 2 years of using xylitol chewing gum.[25~~27-28~~] Use of xylitol gum by mothers (2-3 times per day) starting 3 months after delivery and until the child was

2 years old, reduced the MS levels in children up to 6 years of age and was significantly better than applying fluoride varnish or chlorhexidine varnish at 6, 12, and 18 months after delivery. At 5 years of age, the xylitol group had 70% reduction in caries (dmf) as compared with the varnish and chlorhexidine groups. Fluoride varnish alone had little effect on total salivary levels of MS.~~25~~ 27 Some studies suggest the chewing process may enhance the caries inhibitory effect of xylitol chewing gum.~~26-29~~ 28-31

Xylitol currently is available in many forms (eg, gums, mints, chewable tablets, lozenges, toothpastes, mouthwashes, cough mixtures, nutraceutical products).~~30~~ 32-34Xylitol chewing gum has been shown to be effective as a preventive agent . ~~; however~~The ~~usefulness~~ effectiveness of other xylitol products ~~that have not been~~ is being studied~~. is uncertain and cannot be recommended~~ at this time. ~~because the delivery system and dose/frequency of use both impact the effectiveness of products.~~

Policy statement

The AAPD:

1. supports ~~preventive strategies aimed specifically at long term caries pathogen suppression and caries (dmf) reduction using commercially available non-cariogenic sugar substitutes such as xylitol.~~ the use of xylitol as part of a preventive strategy specifically aimed at long term caries pathogen suppression and caries reduction in higher risk populations.
2. recommends that as further research ~~on xylitol to improve the~~ and evidence-baseded knowledge is available, protocols be established to further clarify the impact of delivery vehicle, ~~and~~ the frequency of exposure and ~~identification of~~ optimal ~~prevention strategies~~ and dosage to reduce caries ~~(dmf)~~ and improve the oral health of children.
3. recommends that when xylitol supplementation is prescribed as part of a caries prevention strategy, it be administered topically 2 or 3 times daily at a total daily dose of 4-8 g.~~28,30,32~~
4. encourages xylitol-containing products be ~~to be labeled~~ clearly labeled with regard to their xylitol content to enable dentists and consumers to ~~evaluate fully their therapeutic value~~ insure therapeutic levels of exposure .~~29~~ 31

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Policy on Prevention of Sports-related Orofacial Injuries

Originating Committee
Clinical Affairs Committee

Review Council
Council on Clinical Affairs

Adopted
1991

Revised
1995, 1999, 2002, 2006, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) ~~is concerned about~~ recognizes the prevalence of sports-related orofacial injuries in our nation's youth and the need for prevention. This policy is intended to educate dental professionals, health care providers, educational and athletic personnel on the prevention of sports-related orofacial injuries.

Methods

~~A MEDLINE literature search was conducted using the terms "sports injuries", "injury prevention", "dental injuries", "orofacial injuries", and "mouthguard".~~ This guideline is an update of the previous document, revised in 2006. The update included an electronic search using the search terms, "sports injuries", "injury prevention", "dental injuries", "orofacial injuries", and "mouthguards". FIELD: All Fields; LIMITS: within the last ten years; humans; English; clinical trials; literature reviews. The reviewers agreed upon the inclusion of 48 articles that met the defined criteria. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background

~~Increased competitiveness~~The tremendous popularity of organized youth sports and the high level of competiveness has resulted in a significant number of dental and facial injuries which represent a high percentage of the total injuries experienced in youth sports.[1,2] Over

the past decade, approximately 46 million youths in the United States were involved in "some form of sports".[3] ~~It further is~~ It is estimated that 30 million children in the US participate in organized sport programs.[4] All sporting activities have an associated risk of orofacial injuries due to falls, collisions, ~~and~~ contact with hard surfaces~~.~~, and contact from sports-related equipment. Sports accidents reportedly account for 10-39% of all dental injuries in children.[5] Children are most susceptible to sports- related oral injury between the ages of 7 and 11 years of age.[5,6,38,39] The administrators of youth, high school, and college football, lacrosse, and ice hockey have demonstrated that dental and facial injuries can be reduced significantly by introducing mandatory protective equipment. Popular sports such as baseball, basketball, soccer, ~~field hockey,~~ softball, wrestling, volleyball, and gymnastics lag far behind in injury protection for girls and boys. Youths participating in leisure activities such as skateboarding, inline or roller skating, and bicycling also benefit from appropriate protective equipment.[6-8,40]

Studies of dental and orofacial athletic injuries are reported throughout the medical and dental literature.[9,10] A review of literature published over the past 20 years showed that the injury rate varied greatly depending on the size of the sample, the sample's geographic location, the ages of the participants, and the specific sports involved in the study.[9,10] Although the statistics vary, many studies reported that dental and orofacial injuries occurred regularly and concluded that participation in sports carries a considerable risk of injury .[5,9-12]

Consequences of orofacial trauma for children and their families are substantial because of potential for pain, psychological effects, and economic implications. Children with untreated trauma to permanent teeth exhibit greater impacts on their daily living than those without any traumatic injury.[13,48] The yearly costs of all injuries, including orofacial injuries, sustained by young athletes have been estimated to be as high as 1.8 billion dollars.[4] Although the incidence of dental and orofacial trauma is small in comparison to all traumatic injuries from sports-related accidents, the costs incurred are both disproportionate and high.[5] The National Youth Sports Safety Foundation in 2005 estimated the cost to treat an avulsed permanent tooth and provide follow-up care is between $5000 and $20,000 over a lifetime.[14] Traumatic dental injuries have additional indirect costs that include children's

hours lost from school and parents' hours lost from work, consequences that disproportionately burdens lower income, minority and non-insured children.[42,43,44,45]

The majority of sport-related dental and orofacial injuries affect the upper lip, maxilla, and maxillary incisors, with 50-~~80%~~90% of dental injuries involving the maxillary incisors.[5,9,10,41] Use of a mouthguard ~~may~~ can protect the upper incisors. However, studies have shown that even with a mouthguard in place, up to 25% of dentoalveolar injuries still can occur.[15]

Identifying patients who participate in sports and recreational activities allows the healthcare provider to recommend and implement preventive protocols for individuals at risk for orofacial injuries. In 2000, a predictive index was developed to identify the risk factors involved in various sports. This index is based upon a defined set of risk factors that ~~influence~~ predict the chance of injury including demographic information (age, gender, dental occlusion), protective equipment (type/usage), velocity and intensity of the sport, level of activity and exposure time, level of coaching and type of sports organization, whether the player is a focus of attention in a contact or non-contact sport, history of previous sports-related injury, and the situation (ie, practice vs game).[12,16] Behavioral risk factors (eg, hyperactivity) also have been associated significantly with injuries affecting the face and/or teeth.[17]

~~A health professional may be able to modify certain risk factors such as a patient's dental anatomy and occlusion.~~ The frequency of dental trauma is significantly higher for children with increased overjet and inadequate lip coverage.[18,19] A dental professional may be able to modify these risk factors. Initiating preventive orthodontic treatment in early- to middle-mixed dentition of patients with an overjet >3mm ~~has been proposed~~ has the potential to ~~prevent~~ reduce the severity of traumatic injuries to permanent incisors.[18]

Although some sports-related traumatic injuries are unavoidable, most can be prevented.[12,14,20,21] Helmets, facemasks, and mouthguards have been shown to reduce both the frequency and severity of dental and orofacial trauma.[12] However, few sports have regulations that require their use. The National Federation of State High School Associations mandate mouthguards for only 4 sports: football, ice hockey, lacrosse, and field hockey.[21] Several states have attempted to increase the number of sports which

mandate mouthguard use with various degrees of success and acceptance. Four New England states have been successful in increasing the number of sports requiring mouthguard use to include sports such as soccer, wrestling, and basketball.[21,22]

Initially used by professional boxers, the mouthguard has been used as a protective device since the early 1900's.[10,23] The mouthguard, also referred to as a gumshield or mouth protector, is defined as a "resilient device or appliance placed inside the mouth to reduce oral injuries, ~~particulary~~ particularly to teeth and surrounding structures."[5] The mouthguard was constructed to "protect the lips and intraoral tissues from bruising and laceration, to protect the teeth from crown fractures, root fractures, luxations, and avulsions, to protect the jaw from fracture and dislocations, and to provide support for edentulous space."[24] The mouthguard works by "absorbing the energy imparted at the site of impact and by dissipating the remaining energy."[25]

The American Society for Testing and Materials (ASTM) classifies mouthguards by 3 categories[26]:

1.Type I – Custom-fabricated mouthguards are produced on a dental model of the patient's mouth by either the vacuum-forming or heat-pressure lamination technique.[5,12] The ASTM recommends that for maximum protection, cushioning, and retention, the mouthguard should cover all teeth in one arch, customarily the maxillary arch, less the third molar.[26] A mandibular mouthguard is recommended in patients with a Class III malocclusion. The custom-fabricated type is superior in retention, protection, and comfort.[5,12,25,27,28] When this type is not available, the mouth-formed mouthguard is preferable to the stock or preformed mouthguard.[23,29,30]

~~1.Type I – Stock mouthguards are purchased over-the-counter. They are designed for use without any modification and must be held in place by clenching the teeth together to provide a protective benefit.[5,12] Clenching a stock mouthguard in place can interfere with breathing and speaking, and for this reason, stock mouthguards are considered by many to be less protective.[5,24,39,46,47] Despite these shortcomings of the stock mouthguard, they could be the only option possible for patients with particular clinical presentations such as~~

~~use of orthodontic brackets and appliances and \ or periods of rapidly changing occlusion during mixed dentition.~~

2.Type II – Mouth-formed, also known as "boil-and-bite"~~,~~ mouthguards are made from a thermoplastic material adapted to the mouth by finger, tongue, and biting pressure after immersing the appliance in hot water.[5] Available commercially at department and sporting good stores, these are the most commonly used among athletes but vary greatly in protection, retention, comfort, and cost.[12,39]

3.Type III – Stock mouthguards are purchased over-the-counter. They are designed for use without modification and must be held in place by clenching the teeth together to provide a protective benefit.[5,12] Clenching a stock-mouthguard in place can interfere with breathing and speaking, and for this reason, stock-mouthguards are considered by many to be less protective.[5,24,39,46] Despite these shortcomings of the stock-mouthguard, they could be the only option possible for patients with particular clinical presentations such as use of orthodontic brackets and appliances and \ or periods of rapidly changing occlusion during mixed dentition.

~~3. Type III – Custom-fabricated mouthguards are produced on a dental model of the patient's mouth by either the vacuum-forming or heat-pressure lamination technique.[5,12] The ASTM recommends the custom mouthguard be fabricated for the maxillary arch for Class I and II occlusions, and on the mandibular arch for Class III malocclusions.[26] This~~The custom-fabricated ~~type is superior in retention, protection, and comfort.[5,12,25,27,28] When this type is not available, the mouth-formed mouth-guard~~ mouthguard ~~is preferable to the stock or preformed mouth-guard.[23,29,30]~~

The Academy for Sports Dentistry "recommends the use of a properly fitted mouthguard; encourages the use of a custom fabricated mouthguard made over a dental cast and delivered under the supervision of a dentist; and supports a mandate for use of a properly fitted mouthguard in all collision and contact sports."[31] During fabrication of the mouthguard, it is recommended to establish proper anterior occlusion of the maxillary and mandibular arches, since this will prevent or reduce injury by better absorbing and distributing the force of impact.[41] The practitioner should also consider the patient's vertical dimension of occlusion, personal comfort and breathing ability.[39] By providing cushioning

between the maxilla and mandible, mouthguards also may reduce the incidence or severity of condylar displacement injuries, as well as the potential for concussions.[39,47] ~~[48]~~

Due to the continual shifting of teeth in orthodontic therapy, the exfoliation of primary teeth, and the eruption of permanent teeth, a custom-fabricated mouthguard may not fit the young athlete soon after the impression is obtained.[32] Several block-out methods used in both the dental operatory and laboratory may incorporate space to accommodate for future tooth movement and dental development.[32] By anticipating required space changes, a custom fabricated mouthguard may be made to endure several sports seasons.[32]

Parents play an important role in the acquisition of a mouthguard for young athletes. In a 2004 national fee survey, custom mouthguards ranged from $60 to $285.[33] In a study to determine the acceptance of the 3 types of mouthguards by 7- and 8-year old children playing soccer, only 24% of parents surveyed were willing to pay $25 for a custom mouthguard.[34] Therefore, cost may be a barrier.[33]

Attitudes of officials, coaches, parents, and players about wearing mouthguards influence their usage.[35] Although coaches are perceived as the individuals with the greatest impact on whether or not players wear mouthguards, parents view themselves as equally responsible for maintaining mouthguard use.[35,36] However, ~~parental views about~~ surveys of parents regarding the indications for mouthguard usage reveal a lack of complete understanding of the benefits of mouthguard use.[35] Players' perceptions of mouthguard ~~usage~~ use and comfort largely determine their compliance and enthusiasm.[25,34] Therefore, the dental profession needs to influence and educate all stakeholders about the risk of sports-related orofacial injuries and available preventive strategies.[23,33,37] Routine dental visits can be an opportunity to initiate patient/parent education and make appropriate recommendations for use of a properly-fitted athletic mouthguard.[12]

Policy statement

The AAPD recommends:

1. dentists play an active role in educating the public in the use of mouthguards and protective equipment for the prevention of orofacial injuries during sporting and recreational activities ~~to prevent orofacial injuries~~;

2. continuation of preventive practices instituted in youth, high school and college football, lacrosse, field hockey and ice hockey;
3. for youth participating in organized baseball and softball activities, an ASTM-certified face protector be required (according to the playing rules of the sport);
4. mandating the use of properly fitted mouthguards in other organized sporting activities ~~with~~ that carry risk of orofacial injury;
5. prior to initiating practices for a sporting season, coaches/administrators of organized sports consult a dentist with expertise in orofacial injuries for recommendations for immediate management of sports-related injuries (eg, avulsed teeth);
6. continuation of research in development of a comfortable, efficacious, and cost-effective sports mouthguard to facilitate more widespread use of this proven protective device;
7. dentists of all specialties, including pediatric and general dentists, provide education to parents and patients regarding prevention of orofacial injuries as part of the anticipatory guidance discussed in dental visits;
8. dentists should prescribe, fabricate or provide an appropriate referral for mouthguard protection for patients at increase risk for orofacial trauma;
9. that third party payors realize the benefits of mouthguards for the prevention and protection from orofacial sports-related injuries and encourages them to improve access these services;
~~7.~~10. the Academy for Sports Dentistry and the International Association of Dental Traumatology be consulted as valuable resources for the professions and public.

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Policy on Tobacco Use

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2000

Revised
2003, 2006, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD), in order to reduce the incidence of pain, chronic disease, disability, and death caused by nicotine addiction, recommends routine screening for tobacco use, treating tobacco dependence, preventing tobacco use among children and adolescents, and educating the public on the enormous health and societal costs of tobacco.

Methods

This policy revision is based ~~upon~~ on a review of current dental, medical, and public health literature related to tobacco use. ~~A MEDLINE~~ An electronic search was conducted using the terms "tobacco", "teen tobacco use", "tobacco use in children", ~~and~~ "smoking", "smokeless tobacco", "smokeless tobacco and oral disease", "pregnancy and smoking", "pregnancy and tobacco", "secondhand smoke" and "caries and smoking". Web sites for the American Lung Association, American Cancer Society, Centers for Disease Control and Prevention, Environmental Protection Agency, Campaign for Tobacco Free Kids and US Department of Health and Human Services were reviewed. FIELD: All fields; LIMITS: within the last 10 years; humans; English; clinical trials; birth through age 19. 316 articles matched these criteria. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and /or consensus opinion by experienced researchers and clinicians.

Background

~~Tobacco use, principally cigarette smoking, remains the leading preventable cause of disease and premature death in the US and imposes substantial health-related and economic costs to society.[1-5] Approximately one third of all tobacco users in this country will die prematurely because of their dependence on tobacco and their addiction to nicotine.[1] Significant oral, dental, and systemic health consequences associated with all forms of tobacco use (ie, cigarettes, cigars, smokeless [spit] tobacco, pipes) are well documented in the literature. Such consequences include oral cancer, periodontal disease, cardiovascular disease, pulmonary diseases, and lung cancer.[5-8] The 2004 US Surgeon General report on health effects of smoking identified a number of diseases caused by, but not previously causally associated with, smoking. The list included cancers of the stomach, uterus, cervix, pancreas, and kidney; acute myeloid leukemia; pneumonia; abdominal aortic aneurysm; cataract; and periodontitis.[9] Smoking during pregnancy is associated with adverse outcomes, including low birth weight, intrauterine growth retardation, and infant morbidity and mortality, as well as negative consequences for child health and development.[1,5,10-12] Recent studies have concluded exposure to environmental tobacco smoke (ETS; eg, second-hand or sidestream smoke, passive smoking) also presents serious health hazards including cancer and heart disease in healthy nonsmokers.[2,4,5,13,14] Infants and children exposed to ETS have higher rates of lower respiratory illness, middle ear infections, asthma, and caries in the primary dentition and are at increased risk for sudden infant death syndrome (SIDS).[2,4,5,12-16]~~

~~Smoking and smokeless tobacco use almost always are initiated and established in adolescence. One third of all smokers had their first cigarette by age 14, and 28% of high school students report using some type of tobacco.[17,18] The earlier that children and adolescents begin using tobacco, the more likely they will become highly addicted and continue using as adults.[2] If current tobacco use patterns continue in the US, an estimated 6.4 million persons now under the age of 18 will die prematurely from a tobacco-related illness.[5,19] Each year in the US, tobacco kills more citizens than alcohol, cocaine, heroin, homicide, suicide, car accidents, fire, and autoimmune deficiency syndrome (AIDS) combined.[2]~~

Tobacco is a risk factor for 6 of the 8 leading causes of deaths in the world and kills up to one-half of its users.[1] In the US, the Surgeon General Report states that smoking is the single greatest avoidable cause of death.[2] This report concludes that even in nonsmokers, secondhand smoke exposure causes disease and death.

The Center for Disease Control (CDC) has conducted a National Youth Tobacco Survey (NYTS) for the years 1999, 2000, 2002, 2004 and 2006 as part of the Healthy People 2010 objectives on tobacco use.[3] While middle school students showed a decrease in the use of cigarettes, cigars and bidis (unfiltered cigarettes from India)[4], they did not show a change in the use of smokeless tobacco, pipes or kreteks (unfiltered cigarettes from India)[4] between 2004 and 2006.[4,5] Unfortunately during this same period, no significant change was seen in the tobacco use of high school students.[4,5] Tobacco use among high school students is 20.0% or 3.5 million, while 19.8% of adults smoke[5,6] Smokeless tobacco is seen in 13.4% of male high school students and 2.3% of females.[5,6] Each day approximately 3,600 youth between 12 – 17 years of age try smoking with 1,100 a day becoming regular daily users.[6,7]

Risk factors for tobacco use include: 440,000 deaths per year from smoking and an additional 50,000 deaths per year from secondhand smoke[5,6]. Other catastrophic risk factors are: cardiovascular disease; reproductive effects; pulmonary disease; cancers of the cervix, kidney, pancreas, stomach, lung, larynx, bladder and esophagus; leukemia; cataracts; abdominal aortic aneurysm; bronchitis; and other lung diseases including pneumonia.[7,8]

~~Smoking and tobacco use is linked to cancer of the oral cavity.[7] This includes smokeless tobacco that also carries the risk of oral cancer.[8]~~

Secondhand exposure to tobacco smoke imposes significant risks as well. Cardiovascular disease and lung cancer are increased by 25-30% in nonsmokers who inhale secondhand smoke.[9] Infants and children who are exposed to smoke are at risk for Sudden Infant Death Syndrome (SDS), acute respiratory infections, middle ear infections, bronchitis, pneumonia, asthma[10], allergies[11,12], and infections during infancy.[13] Caries in the primary dentition is also related to secondhand smoke exposure.[14,15,16] Enamel hypoplasia in both the primary and permanent dentition is also seen in children exposed to cigarette smoke.[17]

A new term, "thirdhand" smoke, has been proposed to describe the particulate residual toxins that are deposited in layers all over the home after a cigarette has been

extinguished.[18] These volatile compounds are deposited and "off gas" into the air over months.[19,20] Since children inhabit these low-lying contaminated areas and because the dust ingestion rate in infants is more than twice that of an adult, they are even more susceptible to thirdhand smoke. Studies have shown that these children have associated cognitive defects in addition to the other associated risks of secondhand smoke exposure.[21]

Tobacco use can result in oral disease. Oral cancer[9], periodontitis,[22-25] compromised wound healing, a reduction in the ability to smell and taste, smoker's palate and melanosis, coated tongue, staining of teeth and restorations, implant failure and leukoplakia[26,27] are all seen in tobacco users. Smokeless tobacco is a risk factor for periodontal conditions[28-30] and oral cancer.[31]

Initiation of tobacco use begins before age 19 for 90% of adult smokers.[32] In fact, most studies show that people who do not use tobacco as a teen never use it.[32] Aggressive marketing of tobacco products by manufacturers[33,34], smoking by parents[35], peer influence, a functional belief in the benefits and normalcy of tobacco[36], availability and price of tobacco products, low socioeconomic status, low academic achievement, lower self image and a lack of behavioral skills to resist tobacco offers all contribute to the initiation of tobacco use during childhood and adolescence[37]. Teens who use tobacco are more likely to use alcohol and other drugs and engage in high risk sexual behaviors.[37]

The monetary costs of this addiction and resultant morbidity and mortality is staggering. Annually, cigarette smoking costs the U.S. $193 billion, based on lost productivity (more than $97 billion) and health care expenditures (more than $96 billion).[38] Health care cost from the exposure to second hand smoke is about $10 billion annually.[38] Contrast this with tobacco industry expenditures on advertising and political influence of $13.11 billion in 2005.[39]

Current trends indicate that tobacco use will cause more than 8 million deaths a year by 2030.[40] It is incumbent on the healthcare community to reduce the burden of tobacco related morbidity and mortality by supporting preventive measures, educating the public about the risks of tobacco and screening for tobacco use and nicotine dependence.

Policy statement

The AAPD opposes the use of all forms of tobacco including cigarettes, pipes, cigars, bidis[4], kreteks[4], and smokeless tobacco and alternative nicotine delivery systems (ANDS), such as tobacco lozenges, nicotine water, nicotine lollipops, or "heated tobacco" cigarette substitutes[1]. The AAPD supports national, state, and local legislation that eliminates tobacco advertising and promotions that appeal to or influence children, adolescents, or special groups. The AAPD supports prevention efforts through merchant education and enforcement of state and local laws prohibiting tobacco sales to minors. As environmental tobacco smoke (ETS) is a "known human carcinogen" and there is no evidence to date of a "safe" exposure level to ETS (second-hand or passive smoke),[13] [40] the AAPD also supports the enactment and enforcement of state and local clean indoor air and/or smoke-free policies or ordinances prohibiting smoking in public places.

Furthermore, the AAPD encourages its members to:

1. promote and establish policies that ensure dental offices, clinics, and/or health care facilities, including property grounds, are tobacco free;
2. support tobacco free school laws and policies as advocated by the American Dental Association;[41,42]
3. serve as role models by not using tobacco and urging staff members who use tobacco to stop;
4. routinely examine patients for oral signs and changes associated with ~~of~~ tobacco use;
5. determine and document tobacco use by patients and smoking status of their parents, guardians, and caregivers;
6. educate patients, parents, and guardians on the serious health consequences of tobacco use and exposure to ETS in the home;
7. provide both prevention and cessation services using evidence-based interventions identified as "best practice" for treating tobacco use and nicotine addiction;
8. work to ensure all third-party payors include "best practice" tobacco cessation counseling and pharmacotherapeutic treatments as benefits in health packages;
9. work with school boards to increase tobacco-free environments for all school facilities, property, vehicles, and school events;

10. work on the national level and within their state and community to organize and support anti-tobacco campaigns and to prevent the initiation of tobacco use among children and adolescents, eliminate cigarette sales from vending machines, and increase excise tax on tobacco products to reduce demand;
11. work with legislators, community leaders and healthcare organizations to ban tobacco advertising, promotion and sponsorships;
~~10.~~ 11. organize and support efforts to pass national, state, and local legislation prohibiting smoking in businesses such as day-care centers where children routinely visit and other establishments where adolescents frequently are employed;
~~11.~~ 12. establish and support education/training activities and prevention/cessation services throughout the community;
~~12.~~ 13. recognize the US Public Health Service Clinical Practice Guideline "Treating Tobacco Use and Dependence"[35] as a valuable resource.

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~~Policy on Use of a Caries-risk Assessment Tool (CAT) for Infants, Children, and Adolescents~~ Guideline on Caries Risk Assessment and Management

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2002

Revised
2006, 2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that caries-risk assessment and guidelines can assist clinicians with decisions regarding treatment based on caries risk and patient compliance; and is an essential element of contemporary clinical care for infants, children, ~~and~~ adolescents, and persons with special health care needs. These~~is~~ guidelines ~~policy is~~ are intended to educate healthcare providers and other interested parties on the assessment of caries risk in contemporary pediatric dentistry and aid in clinical decision making regarding diagnostic, fluoride, dietary and restorative protocols.

Methods

~~This policy revision is based on a review of the current dental and medical literature related to caries-risk assessment tools and methodologies. A MEDLINE search was conducted using the terms "caries risk", "caries assessment", and "caries management tool". Expert opinions and best current practices also were relied upon for this policy~~.

This guideline is an update of the previous document, Policy on Use of a Caries-risk Assessment Tool (CAT) for Infants, Children, and Adolescents", revised in 2006, as well as including the additional concepts of dental caries protocols. The update used electronic and hand searches of English written articles in the medical and dental literature within the last ten

years using the search terms, "caries risk assessment", "caries management", and "caries clinical protocols". From this search 1,909 articles were evaluated by title or by abstract. Information from 75 articles were used to update this guideline. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

~~Background~~ Caries Risk Assessment

Risk assessment procedures currently used in medical practice normally have sufficient data to accurately quantitate disease susceptibility of a person and allow for preventive measures. [1] Even though caries risk data in dentistry still are not sufficient to quantitate the models, the process of determining risk should be a necessary component in the clinical decision making process.[2] Risk assessment fosters the treatment of the disease process instead of treating the outcome of the disease; it gives an understanding of the disease factors for a specific patient and aids in individualizing preventive discussions with patients; it individualizes and selects and determines frequency of preventive and restorative treatment for a patient; and it anticipates caries progression or stabilization.

Caries risk assessment models currently involve~~s~~ a combination of factors including diet, fluoride exposure, a susceptible host, ~~and~~ microflora and ~~that interplay with~~ a variety of social, cultural, and behavioral factors.[3-6] ~~Most young children appear to acquire some cariogenic microbes [eg, mutans Sstreptococci (MS)] from their mothers or primary caregivers.[6] Traditionally, multifactorial caries risk studies have focused on evaluation of biological, demographic, and dietary factors and have used cavitation of a carious lesion (prevalence or incidence) as the outcome variable.[8]~~ Caries risk assessment is the determination of the likelihood of the incidence of caries (i.e., the number of new cavitated or incipient lesions) during a certain time period, [7] or ~~. It also involves~~ the likelihood that there will be a change in the size or activity of lesions already present. With the ability to detect caries in its earliest stages (i.e., white spot lesions), health care providers can help prevent cavitation.[8-10]

~~Strategies for managing caries increasingly have emphasized the concept of risk assessment as evidenced by incorporating such principles into guidelines for pit and fissure sealants,~~

professional topical fluoride and radiographic criteria.[19] In 2002, while recognizing that assessment of caries risk undoubtedly would benefit from emerging science and technologies, the AAPD took a first step toward incorporating available evidence into a framework for classifying caries risk in infants, children, and adolescents.[20] This tool was based on a set of physical, environmental, and general health factors and intended to be a dynamic instrument that would be evaluated and revised periodically as new evidence warranted.[21-24]

Risk assessment is a necessary component in the clinical decision making process.[25] Caries risk indicators are variables that either currently are thought to cause the disease directly (eg, microflora) or have been shown useful in predicting it (eg, socioeconomic status). These risk factors may vary with race, culture, and ethnicity[26-32] and may be useful in the clinical management of caries by helping to determine if additional diagnostic procedures are required, identify subjects who require caries control measures, assess the impact of caries control measures, guide in treatment planning decisions, and determine the timing of recall appointments.[16,33-35]

Since the etiology of caries is multi-factorial, it has been suggested that risk assessment should be directed at the evaluation of all factors involved with the disease.[36,37] Studies have indicated that for the success of a caries-risk assessment model, 1 or more social, behavioral, microbiologic, environmental, and clinical variables should be included.[31,33,38] However, requiring an oral examination can hamper the utility of this process in population subgroups that have not sought dental care (eg, many preschool children, especially those from minority populations).

A systematic review of literature concerning caries risk indicators concluded that, for caries prediction in primary teeth, previous caries experience was the best predictor,[25] followed by level of parental education[39] and socioeconomic status.[40] While previous caries experience may be the best indicator of future disease, using it to identify children at high risk comes too late to prevent caries initiation. Most studies do not report the presence of noncavitated lesions,[25,41,42] although such lesions have been shown to have predictive value.[43,44] Another important risk factor in young children is the age of MS colonization. The earlier in infancy that high levels of

~~MS colonization occur, the more severe the caries in the primary dentition.[45-47] Early childhood caries is an infectious process that too frequently requires expensive and extensive intervention. Identifying factors that determine those individuals at highest risk – either prior to or very shortly after teeth begin to erupt – is imperative to allow for possible preventive intervention.[25,48] Once identified, these factors should be assessed using a reliable and valid tool that is useable by both dental practitioners and trained nondental health professionals.[49]~~

Caries risk indicators are variables that ~~either currently~~ are thought to cause the disease directly (e.g., microflora) or have been shown useful in predicting it (e.g., socioeconomic status), and includes those variables that may be considered protective factors. Currently, there are no caries risk factors or combination of factors that have achieved high levels of both positive and negative predictive values.[2] Although the best tool to predict future caries is past caries experience [2], it is not particularly useful in young children since it is important to determine caries risk before the disease is manifest. Children with white spot lesions should be considered at high caries risk since white spot lesions are precavitated lesions that are indicative of caries activity in the mouth. [11] Plaque accumulation also is strongly associated with caries development in young children.[12,13] As a corollary to the presence of plaque [14], a child's mutans streptococci levels,[3] and the age that a child becomes colonized with cariogenic flora [15-16] are valuable in risk assessment, especially in preschool children.

While there is no question that fermentable carbohydrates are a necessary link in the causal chain for dental caries, a systematic study of sugar consumption and caries risk has concluded that the relationship between sugar consumption and caries is much weaker in the modern age of fluoride exposure than previously thought.[17] However, there is evidence that night-time use of the bottle, especially when it is prolonged, may be associated with early childhood caries.[18] Despite the fact that normal salivary flow is an extremely important intrinsic host factor providing protection against caries, there is little data about the prevalence of low salivary flow in children.[19,20]

Sociodemographic factors have been extensively studied to determine their effect on caries risk. Children with immigrant backgrounds have three times higher caries rates than non

immigrants.[21] Most consistently, an inverse relationship~~s~~ between socio-economic status and caries prevalence is found in studies of children less than six years of age. [22] Perhaps another type of sociodemographic variable is parents' history of cavities and abscessed teeth which has been found to be a predictor of treatment for early childhood caries.[23,24]

The most studied factors that are protective of dental caries include systemic and topical fluoride, sugar substitutes, and tooth brushing with fluoridated toothpaste. Teeth of children who reside in a fluoridated community have been shown to have higher fluoride content than those of children who reside in suboptimal fluoridated communities. [25] Additionally, both pre- and post-eruption fluoride exposure maximize the caries preventive effects. [26,27] For those individuals that reside in non-fluoridated communities fluoride supplements have shown a significant caries reduction in primary and permanent teeth.[28] With regard to fluoridated toothpaste, studies have shown consistent reduction in caries experience.[29] Professional topical fluoride applications performed semiannually also reduce caries, [30] and fluoride varnishes generally are equal to that of other professional topical fluoride vehicles.[31]

The effect of sugar substitutes on caries rates have been evaluated in several populations with high caries prevalence.[32] Studies indicate that xylitol can decrease mutans streptococci levels in plaque and saliva and can reduce dental caries in young children and mothers.[33] With regard to tooth-brushing there only is a weak relationship between frequency of brushing and decreased dental caries, which is confounded because it is difficult to distinguish whether the effect is actually a measure of fluoride application or whether it is a result of mechanical removal of plaque.[34] Currently, the "dental home" or regular periodic care by the same practitioner, is included in many caries risk assessment models because of its known benefit for dental health.[35]

Risk assessment tools can aid in the identification of reliable predictors and allow dental practitioners, ~~and trained nondental health care professionals~~ physicians and other non-dental providers to become more actively involved in identifying and referring high-risk children. Tables 1, 2, and 3 ~~The following table~~ incorporate~~s~~ available evidence into ~~a concise,~~ practical

tools to assist ~~both~~ dental practitioners, ~~and nondental health care providers~~ physicians and other non-dental providers in assessing levels of risk for caries development in infants, children, and adolescents. As new evidence emergences, these ~~this~~ tools can be refined to provide ~~and aid in providing~~ greater predictably of caries in children prior to disease initiation. Furthermore, the evolution of caries assessment tools and protocols ~~and CAT~~ can assist in providing evidence for and justifying periodicity of services, modification of third-party involvement in the delivery of dental services, and quality of care with outcomes assessment to address limited resources and workforce issues.

~~Individuals using this tool should:~~

~~1. be able to visualize adequately a child's teeth and mouth and have access to a reliable historian for non-clinical data elements;~~

~~2. be familiar with footnotes that clarify use of individual factors in this instrument;~~

~~3. understand that each child's ultimate risk classification is determined by the highest risk category where a risk indicator exists (ie, the presence of a single risk indicator in any area of the "high risk" category is sufficient to classify a child as being at "high risk"; the presence of at least 1 "moderate risk" indicator and no "high risk" indicators results in a "moderate risk" classification; and a child designated as "low risk" would have no "moderate risk" or "high risk" indicators).~~

~~Users of CAT must understand the following caveats:~~

~~1. CAT provides a means of classifying caries risk at a point in time and, therefore, should be applied periodically to assess changes in an individual's risk status.~~

~~2. CAT is intended to be used when clinical guidelines call for caries risk assessment. Decisions regarding clinical management of caries, however, are left to qualified dentists (ideally, the dentist responsible for the child's dental home).~~

~~3. CAT can be used by both dental and nondental personnel. It does not render a diagnosis. However, individuals using CAT must be familiar with the clinical presentation of dental caries and factors related to caries initiation and progression.~~

~~4. Since clinicians with various levels of skill working in a variety of settings will use this instrument, advanced technologies (ie, radiographic assessment and microbiologic testing) have been included but are not essential for using this tool.~~

~~Evidenced-based recommendations for therapy or treatment according to risk status are minimal,[15,49] as are guidelines for frequency of caries risk reevaluation. Since the carious process is a fluctuating continuum, periodicity of reassessment should be based on risk status (ie, greater frequency for children at high risk).~~

~~**Policy Statement**~~

~~The AAPD:~~

~~1. encourages both dental and non-dental health care providers to use CAT in the care of infants, children, and adolescents and to provide basic preventive counseling;~~
~~2. recommends that non-dental health care providers refer all children, especially those at moderate or high risk, to a dentist for oral health care (ie, establish a dental home);~~
~~3. encourages dentists to use advanced technologies such as radiographic assessment and microbiologic testing with CAT when assessing an individual's caries risk;~~
~~4. recognizes the need to evaluate CAT periodically and revise the tool as new science and technologies warrant.~~

~~The AAPD also encourages the scientific community to:~~

~~1. identify additional predictors of caries experience (eg, survey parent for self-perception of health and determine correlation to child's health);~~
~~2. research genetic factors that contribute to an individual's susceptibility or resistance to caries;~~
~~3. develop technology to detect and quantify early carious lesions and to assess directly carious lesion status (active vs inactive);~~
~~4. provide evidence to establish clinical applications (eg, customized periodicity schedules, preventive regimens, and/or treatment strategies) of CAT.~~

~~—~~

~~Table legends~~

~~[A] Children with special health care needs are those who have a physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services. The condition may be developmental or acquired and may cause limitations in performing daily self-maintenance activities or substantial limitations in a major life activity. Health care for special needs patients is beyond that considered routine and requires specialized knowledge, increased awareness and attention, and accommodation.[50]~~

~~[B] Alteration in salivary flow can be the result of congenital or acquired conditions, surgery, radiation, medication, or age-related changes in salivary function. Any condition, treatment, or process known or reported to alter saliva flow should be considered an indication of risk unless proven otherwise.~~

~~[C] Orthodontic appliances include both fixed and removable appliances, space maintainers, and other devices that remain in the mouth continuously or for prolonged time intervals and which may trap food and plaque, prevent oral hygiene, compromise access of tooth surfaces to fluoride, or otherwise create an environment supporting caries initiation.~~

~~[D] National surveys have demonstrated that children in low-income and moderate-income households are more likely to have caries and more decayed or filled primary teeth than children from more affluent households. Also, within income levels, minority children are more likely to have caries. Thus, socioeconomic status should be viewed as an initial indicator of risk that may be offset by the absence of other risk indicators.~~

~~[E] Examples of sources of simple sugars include carbonated beverages, cookies, cake, candy, cereal, potato chips, French fries, corn chips, pretzels, breads, juices, and fruits. Clinicians using caries-risk assessment should investigate individual exposures to sugars known to be involved in caries initiation.~~

~~[F] Optimal systemic and topical fluoride exposure is based on use of a fluoride dentifrice and American Dental Association/American Academy of Pediatrics guidelines for exposure from fluoride drinking water and/or supplementation.~~

~~[G] Unsupervised use of toothpaste and at home topical fluoride products are not recommended for children unable to expectorate predictably.~~

~~[H] Although microbial organisms responsible for gingivitis may be different than those primarily implicated in caries, the presence of gingivitis in an indicator of poor or infrequent oral hygiene practices and has been associated with caries progression.~~

~~[I] Tooth anatomy and hypoplastic defects (eg, poorly formed enamel, developmental pits) may predispose a child to develop caries.~~

~~[J] Advanced technologies such as radiographic assessment and microbiologic testing are not essential for using this tool.~~

Caries Management Protocols

Clinical management protocols are documents designed to assist in clinical decision making by providing criteria regarding diagnosis and treatment and that lead to recommended courses of action. They are based on evidence from current peer-reviewed literature, the considered judgment of expert panels, as well as clinical experience of practitioners. These protocols should be updated frequently as new technologies and evidence develop.

Historically, the management of dental caries was based on the notion that it was a progressive disease that eventually destroyed the tooth unless there was surgical and restorative intervention. Decisions for intervention often were learned from unstandardized dental school instruction, and then refined by clinicians over years of practice. Still little is known about the criteria dentists use when making decisions involving restoration of carious lesions.[36]

It is now known that surgical intervention of dental caries alone does not stop the disease process. Additionally, many lesions do not progress, and tooth restorations have a

finite longevity. Therefore, modern management of dental caries should be more conservative and includes early detection of noncavitated lesions, identification of an individual's risk for caries progression, understanding of the disease process for that individual, and "active surveillance"to apply preventive measures and carefully monitor for signs of arrestment or progression.

Caries management protocols for children further refine the decisions concerning individualized treatment of caries and treatment thresholds based on a specific patient's risk levels, age, and compliance with preventive strategies (Tables 4, 5, 6). Such protocols should yield greater probability of success and better cost effectiveness of treatment than less standardized treatment. Additionally, caries management protocols free practitioners of the necessity for repetitive high level treatment decisions, standardize the decision making and treatment strategies [36-38] eliminate treatment uncertainties, and guarantee more correct strategies.[39]

Current content of the present caries management protocol are based on results of clinical trials, systematic reviews, and expert panel recommendations that give better understanding to, and recommendations for, diagnostic, preventive and restorative treatments. The radiographic diagnostic guidelines are based on the latest guidelines from the ADA.[40] Systemic fluoride protocols are base on the CDC's recommendations for using fluoride.[29] Guidelines for the use of topical fluoride treatment are based on the ADA's Council on Scientific Affairs' recommendations for professionally applied topical fluoride, [41] the Scottish Intercollegiate Guideline Network guideline for the management of caries in pre-school children,[42] a Maternal and Child Health Bureau Expert Panel,[43] and the CDC's fluoride guidelines.[29] Guidelines for pit and fissure sealants are based on ADA's Council on Scientific Affairs recommendations for the use of pit-and-fissure sealants.[44] Guidelines on diet counseling to prevent caries are based on two review papers.[45,46] Guidelines for the use of xylitol are based on the the AAPD's Oral Health Policy on Xylitol,[32] a well executed clinical trial on high caries risk infants and toddlers,[47] and on two evidence-based reviews.[48,49] Active surveillance (prevention therapies and close monitoring) of enamel lesions is based on the concept that treatment of disease may only be necessary if there is disease progression ;[50] that

caries progression has diminished over recent decades,[51] and that the majority of proximal lesions, even in dentin, are not cavitated.[52]

Other approaches to the assessment and treatment of dental caries will emerge with time, and with evidence of effectiveness, may be included in future guidelines on caries risk assessment and management protocols. For example, there are emerging trends to use calcium and phosphate remineralizing solution to reverse dental caries.[53] Other fluoride compounds, such as silver diamine fluoride,[54] and stannous fluoride [55] may be more effective than sodium fluoride for topical applications. There has been interest in antimicrobials to affect the caries rates, but evidence from caries trials still are inconclusive.[56] However, some other proven methods, such as prescription fluoride drops and tablets, may be removed from this protocol in the future due to attitudes, risks or compliance.[57,58]

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Table 1: Physicians and Other Non-Dental Providers

Caries Risk Assessment Form for 0-3 Year Olds**

Biological Factors	High Risk Factors	Moderate Risk Factors	Protective Factors
Mother/primary caregiver has active cavities	**Yes**		
Parent/caregiver has low socioeconomic status	**Yes**		
Child has >3 between meal sugar containing snacks or beverages per day	**Yes**		
Child is put to bed with a bottle containing natural or added sugar	**Yes**		
Child has special health care needs		**Yes**	
Child is a recent immigrant		**Yes**	
Protective Factors			
Child receives optimally fluoridated drinking water or fluoride supplements			**Yes**
Child has teeth brushed daily with fluoridated toothpaste			**Yes**
Child receives topical fluoride from health professional			**Yes**
Child has dental home/regular dental care			**Yes**
Clinical Findings			
Child has white spot lesions or enamel defects	**Yes**		
Child has visible cavities or fillings	**Yes**		
Child has plaque on teeth		**Yes**	

** Modified from Ramos-Gomez et al., CDA Journal 2007;35:687-702; and ADA Caries Risk Assessment Forms. www.ada.org/prof/resources/topics/topics_caries_under6.doc and over6.doc. Accessed Feb. 30, 2009.

Circling those conditions that apply to a specific patient helps the health care worker and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor in determining overall risk, for instance, frequent exposure to sugar containing snacks or beverages, or visible cavities.

Overall assessment of the child's dental caries risk High ❒ Moderate ❒ Low ❒

Table 2: Dental Providers

Caries Risk Assessment Form for 0-5 Year Olds**

Biological Factors	High Risk Factors	Moderate Risk Factors	Protective Factors
Mother/primary caregiver has active caries	**Yes**		
Parent/caregiver has low socioeconomic status	**Yes**		
Child has >3 between meal sugar containing snacks or beverages per day	**Yes**		
Child is put to bed with a bottle containing natural or added sugar	**Yes**		
Child has special health care needs		**Yes**	
Child is a recent immigrant		**Yes**	
Protective Factors			
Child receives optimally fluoridated drinking water or fluoride supplements			**Yes**
Child has teeth brushed daily with fluoridated toothpaste			**Yes**
Child receives topical fluoride from health professional			**Yes**
Child has dental home/regular dental care			**Yes**
Clinical Findings			
Child has more than one dmfs	**Yes**		
Child has active white spot lesions or enamel defects	**Yes**		
Child has elevated mutans streptococci	**Yes**		
Child has plaque on teeth		**Yes**	

** Modified from Ramos-Gomez et al., CDA Journal 2007;35:687-702; and ADA Caries Risk Assessment Forms. www.ada.org/prof/resources/topics/topics_caries_under6.doc and over6.doc. Accessed Feb. 30, 2009.

Circling those conditions that apply to a specific patient helps the practitioner and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor in determining overall risk, for instance, frequent exposure to sugar containing snacks or beverages, or more than one dmfs.

Overall assessment of the child's dental caries risk High ❒ Moderate ❒ Low ❒

Table 3: Dental Providers

Caries Risk Assessment Form for >6 Years Olds **

Biological Factors	High Risk Factors	Moderate Risk Factors	Protective Factors
Patient has >3 between meal sugar containing snacks or beverages per day	**Yes**		
Patient is of low socioeconomic status	**Yes**		
Patient has special health care needs		**Yes**	
Patient is a recent immigrant		**Yes**	
Protective Factors			
Patient receives optimally fluoridated drinking water			**Yes**
Patient brushes teeth daily with fluoridated toothpaste			**Yes**
Patient receives topical fluoride from health professional			**Yes**
Additional home measures (xylitol, MI paste, antimicrobial)			**Yes**
Patient has dental home/regular dental care			**Yes**
Clinical Findings			
Patient has one or more interproximal lesions	**Yes**		
Patient has active white spot lesions or enamel defects	**Yes**		
Patient has low salivary flow	**Yes**		
Patient has defective restorations		**Yes**	
Patient wearing an intraoral appliance		**Yes**	

** Modified from Featherstone et al., CDA Journal 2007;35:703—713; and ADA Caries Risk Assessment Forms. www.ada.org/prof/resources/topics/topics_caries_under6.doc and over6.doc. Accessed Feb. 30, 2009.

Circling those conditions that apply to a specific patient helps the practitioner and patient understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor in determining overall risk, for instance, one or more interproximal lesion or low salivary flow.

Overall assessment of the dental caries risk High ❒ Moderate ❒ Low ❒

Table 4: Example of a Caries Management Protocol for 1-2 Year Olds

Risk Category	Diagnostics	Interventions		Restorative
		Fluoride	Diet	
Low Risk	--Recall every 6-12 months --Baseline MS α	--Twice daily brushing with F toothpaste β	Counseling	Surveillance χ
Moderate Risk parent engaged	--Recall every six months --Baseline MS	--Twice daily brushing with F toothpaste --Fluoride supplements δ --Professional topical treatment every 6 mo.	Counseling	Active surveillance ε
Moderate Risk parent not engaged	--Recall every six months --Baseline MS	--Twice daily brushing with F toothpaste --Professional topical treatment every 6 mo.	Counseling, with limited expectations	Active surveillance
High Risk parent engaged	--Recall every three months --Baseline and follow up MS	--Twice daily brushing with F toothpaste --Fluoride supplements --Professional topical treatment every 3 mo.	Counseling	--Active surveillance --Restore cavitated lesions with ITR ϕ or definitive restorations
High Risk parent not engaged	--Recall every three months --Baseline and follow up MS	--Twice daily brushing with F toothpaste --Professional topical treatment every 3 mo.	Counseling, with limited expectations	--Active surveillance of incipient lesions --Restore cavitated lesions with ITR or definitive restorations

Table 5: Example of a Caries Management Protocol for 3-5 Year Olds

Risk Category	Diagnostics	Interventions			Restorative
		Fluoride	Sealants	Diet	
Low Risk	--Recall every 6-12 months --Radiographs 12-24 months --Baseline MS	--Twice daily brushing with F toothpaste γ	(Yes) λ	No	Surveillance
Moderate Risk parent engaged	--Recall every six months --Radiographs 6-12 months -- Baseline MS	--Twice daily brushing with F toothpaste --Fluoride supplements --Professional topical treatment every 6 mo.	Yes	Counseling	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
Moderate Risk parent not engaged	--Recall every six months --Radiographs 6-12 months --Baseline MS	--Twice daily brushing with F toothpaste --Professional topical treatment every 6 mo.	Yes	Counseling, with limited expectations	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
High Risk parent engaged	--Recall every three months --Radiographs, six months --Baseline and follow up MS	--Brushing with .5% F (with caution) --Fluoride supplements --Professional topical treatment every 3 mo.	Yes	Counseling	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
High Risk parent not engaged	--Recall every three months --Radiographs, six months --Baseline and follow up MS	--Professional topical treatment every 3 mo.	Yes	Counseling, with limited expectations	Restore incipient, cavitated or enlarging lesions

Table 6: Example of a Caries Management Protocol for >6 Year-Olds

Risk Category	Diagnostics	Interventions			Restorative
		Fluoride	Sealants	Diet	
Low Risk	--Recall every 6-12 months --Radiographs 12-24 months	--Twice daily brushing with F toothpaste μ	(Yes) λ	No	Surveillance
Moderate Risk patient engaged	--Recall every six months --Radiographs 6-12 months	--Twice daily brushing with F toothpaste --Fluoride supplements --Professional topical treatment every 6 mo.	Yes	Counseling	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
Moderate Risk patient not engaged	--Recall every six months --Radiographs 6-12 months	--Twice daily brushing with F toothpaste --Professional topical treatment every 6 mo.	Yes	Counseling, with limited expectations	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
High Risk patient engaged	--Recall every three months --Radiographs, six months	--Brushing with .5% F --Fluoride supplements --Professional topical treatment every 3 mo.	Yes	Counseling Xylitol	--Active surveillance of incipient smooth surface lesions --Restoration of cavitated or enlarging lesions
High Risk patient not engaged	--Recall every three months --Radiographs, six months	--Brushing with .5% F --Professional topical treatment every 3 mo.	Yes	Counseling, with limited expectations Xylitol	Restore incipient, cavitated or enlarging lesions

Legends, Tables 4-6

α Salivary mutans streptococci bacterial levels

β Parental supervision of a “smear” amount of tooth paste

χ Surveillance = periodic monitoring for signs of caries progression

δ Need to consider fluoride levels in drinking water

ε Active Surveillance = careful monitoring of caries progression and prevention program

ϕ ITR – Interim Therapeutic Restoration (AAPD Reference Manual, 2008)

γ Parental supervision of a “pea sized” amount of tooth paste

λ indicated for teeth with deep fissure anatomy or developmental defects

μ Less concern about the quantity of tooth paste

Fig 1: Clinical Management of Avulsed Permanent Incisors with an Open Apex

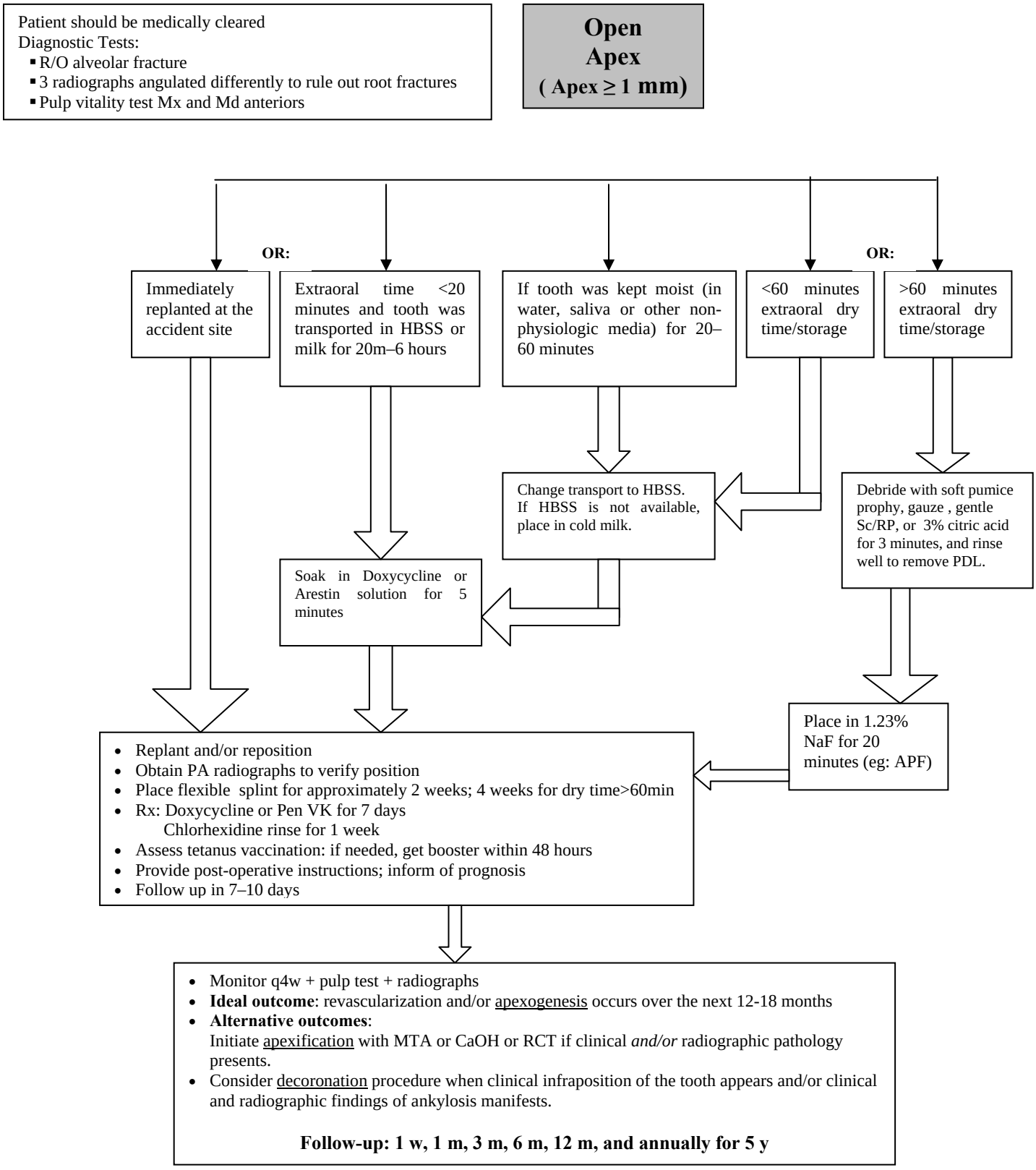
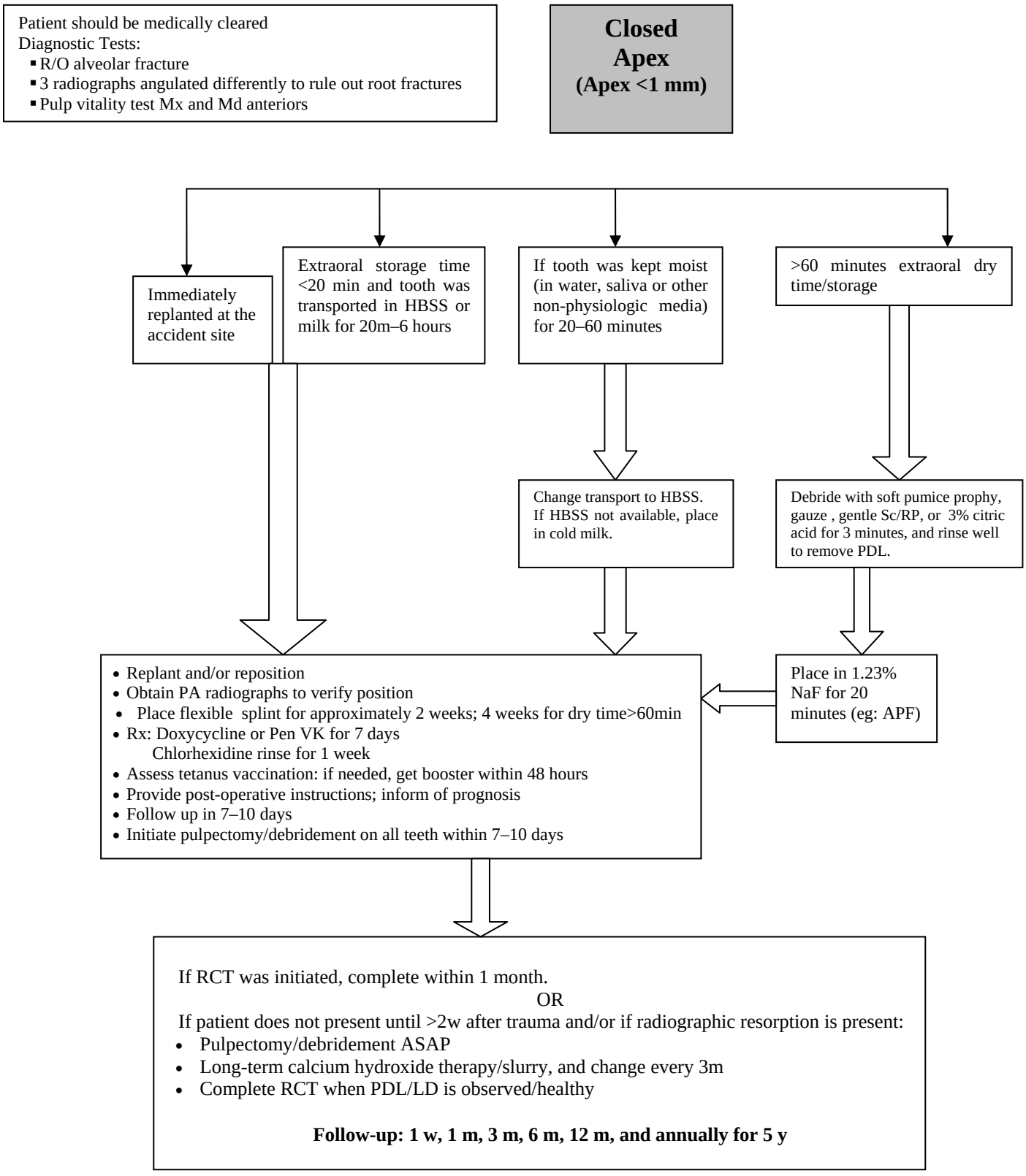


Fig 2: Clinical Management of Avulsed Permanent Incisors with a Closed Apex



AMERICAN ACADEMY OF PEDIATRIC DENTISTRY LOGO (AAPD)

A Message to Parents and School Administrators Regarding School Absence for Dental Appointments

Tooth decay in children can be painful, just as it is in adults. Although largely preventable with proper home care and regular dental visits, untreated tooth decay diminishes the child's ability to eat, sleep, and function well at home or at school. The unesthetic nature of tooth decay and dental malocclusion also may compromise the child's self-esteem and social development. Prevention, early diagnosis, and treatment of oral health conditions require professional care.

The **American Academy of Pediatric Dentistry** recognizes the importance of regular school attendance and the effect of chronic absence on academic performance. We encourage our members to work with parents and educators to minimize school absence whenever possible. It is not always possible or appropriate to provide all the care children need during non-school hours. **School policies that prevent legitimate school absence for the purpose of dental visits may have a negative impact on the health and well being of children.**

The **American Academy of Pediatric Dentistry** urges parents, school administrators, and member dentists to work together to ensure that children receive needed health care while minimizing school absences. The **American Academy of Pediatric Dentistry** encourages parents to return their children to school for the remainder of the day after their dental visit when possible. In the case of an appointment later in the day, the child should attend school and be excused prior to their dental appointment.

School Attendance Release

_____ had an appointment

in this office on _____ from _____ to _____

for necessary oral health care.

Policy on Second Opinion

Originating Council

Council on Clinical Affairs

Adopted

2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that second opinions are one avenue for additional information regarding health care issues. Parents frequently seek additional information and/or other opinions in order to address their child's health care needs and make informed decisions. This policy is intended to provide guidance to the pediatric dentist by addressing what should be obtained and documented when providing a second opinion, as well as an understanding of the ethical and legal obligations involved in the process.

Methods

This policy is based on a review of the current dental and medical literature related to the concept of second opinion in dentistry and medicine. An electronic search and a MEDLINE search was conducted using the search terms, "second opinion", "medical second opinion", and "dental second opinion". Documents relating to principles of ethics of dental and medical organizations were also reviewed.

Background

Patients today are more informed about their medical and dental problems and treatment

options, and are playing an active role in decision making with their doctors. Medical and dental knowledge and available treatment options are also evolving at a rapid pace and it is becoming increasingly difficult for health care providers to be fully aware of all the latest advances and information. As a result, patients and health care providers are seeking second opinions so that more informed decisions can be made regarding the patient's health care based on the risks and benefits.

For minor health problems, second opinions are usually unnecessary. However, a second opinion is recommended if the patient disagrees with or questions the diagnosis or the treatment plan of the health care provider, has multiple medical problems, or is diagnosed with a life-threatening disease such as cancer. Second opinions are also recommended when there is no improvement in the patient's condition, when there is a communication barrier between the patient and the provider and additionally, when extensive oral care needs or high cost may make treatment prohibitive. For the health care practitioner, a second opinion or referral may be warranted if they are unsure of the diagnosis, or the diagnosis/treatment is beyond the scope of their expertise. A second opinion may also be necessary when required by a third party payor.

There is a debate among health care providers about whether to provide a patient with a "blind" second opinion (ie, when medical/dental records, test results and first provider's opinion are not made available to the second provider) or if the patient's diagnostic information and diagnosis should be shared with the provider giving the second opinion. The advantage of the "blind" second opinion is that it cannot be influenced by previous information. The provider will develop their own unbiased opinion. The disadvantage is that the provider performing the second opinion may have to repeat diagnostic tests and the patient will incur additional costs. The second provider may also not be able to explain to the patient why his/her opinion is different without knowing the patient's previous history and the basis of the first provider's opinion. A third option would be to provide test results, radiographs and other information without the first doctor's written diagnosis and treatment recommendations. This would allow for an unbiased opinion without having the patient incur unnecessary charges or radiation exposure from repeated radiographs.

When presented with requests for second opinions, practitioners should consider the legal implications of such request. Health care providers rendering second opinions could be unwarily involved in litigation, either on behalf of the patient or in defending themselves against other practitioners, as a result of the consult. [6] The fact that one is the second or third professional consulted does not mean that the provider is exempt from liability.[7] A dissatisfied patient could file a lawsuit naming not only the treating doctor, but also the doctor rendering the second opinion as defendants. In addition, a colleague who believes his or her professional reputation has been damaged by statements made to a patient during a consultation could file a lawsuit for defamation of character. Patients should be advised of their health status without disparaging comments about their prior treatment or previous provider.

Policy statement

The AAPD recommends that:

1. A patient has a right to a second opinion. A provider who is trained and experienced in diagnosing and treating the condition should provide the second opinion. Internet sites or a telephone conversation cannot be relied upon and should not constitute a second opinion.[1]

2. A health care practitioner has the right to request a second opinion from one or multiple practitioners/specialists as deemed necessary to facilitate the optimal clinical outcome. [2]

3. Educating the patient regarding the diagnosis, available treatment options, their risks and benefits should be the goal of a second opinion consultation. Health care providers may disagree on the best treatment for an individual patient. Any opinion should be rendered only on careful consideration of all the facts and with due attention given to current and previous states of the patient. Instances of gross or continual faulty diagnosis or treatment by other providers may require that the provider be reported to an appropriate reviewing agency as determined by the local component or constituent dental society.[2]

4. A provider has the ethical obligation on request of either the patient or the patient's new provider to furnish records, including radiographs or copies of them. These may be beneficial for the future treatment of that patient [2]. HIPAA privacy rules and state laws

apply to all exchanges of health care information.

5. Second opinions may be mandatory by third party payers. The provider should be independent and the opinion should be based on best outcomes for the patient and not financial incentives.

6. Most second opinions are voluntary. It is the responsibility of the patient to check with their insurance carrier for specific policies and benefits regarding coverage of second opinions.

7. When presented with requests for second opinions, practitioners should consider the legal implications of such request. Patients should be fully advised of their health status without disparaging comments about their prior treatment or previous provider.

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Policy on Absences from School for Dental Appointments

Originating Council
Council on Clinical Affairs
Adopted
2010

Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes dental care as medically necessary and that poor oral health can negatively affect a child's ability to learn. This policy is intended to assist public health and school education administrators developing enlightened policies on school absence for dental appointments. It also is intended to assist parents in making informed decisions.

Methods

This policy is based on a review of current dental, medical, educational, and public health literature and state statute and regulation related to student absence for dental appointments. An electronic search was conducted using the search terms, "school absences for dental appointments", "excused school absences", and "department of education". Fields: All fields; Limits: within the last 10 years; humans; English. 841 articles matched these criteria. Papers for review were chosen from this list and from references within selected articles. When data did not appear sufficient or were inconclusive, recommendations were based on expert and/or consensus opinion by experienced researchers and clinicians. It is beyond the scope of this document to review every state statute and regulation on absences from school for dental appointments.

Background

Oral health is integral to general health. Oral conditions can interfere with eating and adequate nutritional intake, speaking, self-esteem and daily activities.[1] Dental care is medically necessary to prevent and eliminate orofacial disease, infection, pain. It is also important to restore the form and function of the dentition, and correct facial disfiguration or dysfunction. [2] The public's lack of awareness of the importance of oral health is a major barrier to dental care.[3]

Unrecognized disease and postponed care result in exacerbated problems, which lead to more extensive and costly treatment needs. [2]

The National Association of State Boards of Education recognizes "health and success in schools are interrelated. Schools cannot achieve their primary mission of education if students and staff are not healthy and fit physically, mentally, and socially".[4]

Children with dental pain may be irritable, withdrawn, or unable to concentrate. Pain can affect test performance as well as school attendance.[3] Left untreated, the pain and infection caused by tooth decay can lead to problems in eating, speaking, and learning.[5] In 1996, students aged 5 to 17 missed an average of 3.1 days/100 students due to acute dental problems.[1] When these problems are treated and children no longer are experiencing pain, their learning and school attendance improved.[1]

According to the US Surgeon General, "a national public health plan for oral health does not exist".[3] This corresponds with the fact that there is no national policy on excused absences from school for dental appointments. Some states, for example California and Texas have very specific laws excusing students for dental appointments. [6,7] Other states laws are more general and recognize absences due to doctors appointments or illness.[8,9]

Policy statement

Dental care is medically necessary and oral health is integral to general health. Undiagnosed and untreated oral conditions may interfere with a child's ability to eat, sleep, or function well at home or at school due to discomfort or pain. The unesthetic nature of caries and dental malocclusion may compromise a child's self-esteem and social development. School policies that prevent or discourage legitimate school absence for the purpose of delivery of vital health care services may cause harm to their students.

Children who have dental conditions corrected improve their learning and attendance in school. State laws and local school district policies are not uniform on this issue. A uniform policy guideline that recognizes the negative effect of chronic truancy on academic performance would be useful. This policy should not restrict necessary health care delivery.

The AAPD:

1. Recommends state law or school policy that allows the absence for legitimate healthcare delivery, including that of oral health services.
2. Encourages parents, school administrators, and dentists to work together to ensure that children receive dental care while minimizing school absences.

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