

# Addressing Adolescent Oral Health: A Review

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## Practice Gap

Pediatric providers often overlook oral health issues for adolescents, including caries prevention, oral piercing complications, sports injury prevention, and orthodontic issues.

## Abstract

Oral health is one of the most unmet health care needs of adolescents. Oral disease can have a profound effect on overall health, including pain, missed school, heart disease, and even death. Adolescents have specific needs pertaining to oral health in addition to the usual lifelong issues of caries management, sports injury prevention, and dental referrals. Teen years are a higher risk time for oral piercings, increased sugar intake, nicotine initiation, and orthodontic considerations. Adolescents need a unique approach to motivate them about their oral health issues. This is particularly important because lifelong health habits are created during these formative years, and prevention opportunities for sealants and varnish are only available at this age.

## Objectives

*After completing this article, readers should be able to:*

1. Implement strategies in the office to reduce caries and periodontitis in adolescents including active discussions about dental hygiene, dietary modifications, thorough oral examinations, and dental referrals.
2. Respond to questions about orthodontic care with improved awareness and knowledge.
3. Supplement current approaches to discussing tobacco product abstinence.
4. Actively address oral sports prevention at all health maintenance visits.
5. Activate adolescents to either avoid oral piercings and grills or care properly for existing apparatus.
6. Engage adolescents on these topics using motivational interviewing techniques focused on their needs and interests.

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### ABBREVIATIONS

AAP	American Academy of Pediatrics
ADA	American Dental Association
CDC	Centers for Disease Control and Prevention
CSPTF	Community Services Preventive Task Force

Oral health in adolescents is often overlooked in primary care. Oral health care is the most unmet health care need in children and adolescents. (1) One in 16 children in the United States, about 4.6 million children, do not have professional oral care because of familial monetary constraints. (1) Even in young persons with Medicaid, which covers dental care, fewer than 50% receive dental care in any given year. (2) As a result, it often falls on the primary care provider to provide oral health education, risk assessments, and preventive measures such as applying fluoride varnish. Fortunately, oral health is becoming a regular aspect of primary care training and continuing medical education.

Why is oral health so important? There is increasing evidence that poor oral health contributes to various disease states including diabetes and coronary artery disease. (3) Furthermore, a basic cavity can lead to significant pain, poor school performance or absences, and even death (via airway or brain infections) if not treated properly. Adolescents have very specific oral health needs and concerns: high rates of caries, orthodontic and restoration care, increased risk of traumatic injury, and dental phobia. There are also other broader health issues that affect the mouth during teen years such as poor dietary habits, increased aesthetic awareness, potential alcohol and drug use, eating disorders, teen pregnancy, and other social and psychological issues. (4)

Adolescence offers health care providers an opportunity to address health issues with an emphasis on what matters to teenagers. For this age group, issues like “fitting in” with peers and exerting independence in various aspects of their lives are important and can be incorporated into health messaging. Lessons about good oral health can be linked to dating, popularity, self-esteem, employment, and success in life. (5) This is also an impressionable time to create long-term habits. In this article, we will review each aspect of adolescent and college-age oral health and how the primary care provider can address these important issues.

## CARIES AND PERIODONTITIS

The Centers for Disease Control and Prevention (CDC) report that nearly 3 in 5 adolescents of ages 12 to 19 years have caries in their permanent teeth and 15% have untreated decay. (6) This translates to every high school classroom in the United States having 3 to 4 children with untreated decay, some of them in pain. Black and Hispanic teens and those in low-income families have higher rates of untreated caries. (7)

Periodontitis (deep inflammation of the gums and dental ligaments) is increased in this population. Adolescents also have a higher prevalence of gingivitis (superficial inflammation) compared with adults and prepubertal children.

Studies suggest that hormonal changes affect the composition of oral flora and alter capillary permeability. (4) Deep inflammation of the gingiva is a disease process that is linked to conditions such as diabetes, heart disease, and even obesity. (3)

A thorough oral examination looking for discoloration of teeth (white and brown spots) and inflammation of gums (gingivitis) should be performed during annual physicals, with an appropriate dental referral made if needed (Figs 1 and 2). (For online resources for learning about proper oral examination techniques, see Table.) For physicians, it is important to be aware of preventive measures for caries and gum disease in adolescents. Encouragement of simple measures, such as brushing twice a day and flossing daily, can be quite effective. A little effort at prevention may offer a patient a life of prevention from more serious diseases.

## ORAL HYGIENE AND DENTAL REFERRALS

Teens experience evolving independence over their personal care, and oral hygiene may become a lower priority. Moreover, teens are making more choices about their diet, which may include a high consumption of sugary foods and drinks. Daily plaque removal through brushing and flossing are beneficial in reducing caries. Although there are no robust studies verifying the frequency of these interventions, expert opinion recommends daily flossing and twice-daily brushing with a fluoridated toothpaste to decrease plaque formation. (8)(9) A Cochrane review shows that electric toothbrushes are more effective at reducing plaque and decreasing gingivitis than a manual toothbrush in adulthood. (10) For teens with less than optimal dental care, breaking bad habits may be challenging. Proper brushing and flossing techniques should be demonstrated in the



Figure 1. Early demineralization (white spots) and progressive demineralization (yellow/brown spots) along gum line. (Photo courtesy of Drs. Steve Levy and John Warren.)



**Figure 2.** Gingivitis secondary to plaque. Note swollen gums and erythema close to teeth and secondary to plaque.

office; a video can work well for this. Because teens are more aware of aesthetics, strategies to improve oral hygiene may include emphasizing that a healthy smile is very important for maintaining outward appearances and decreasing bad breath.

Referring teens to a dental home is important for professional removal of plaque and calculus at least twice a year. Radiographs can be taken to identify early caries, which can lead to treating caries early with restorations rather than delayed care leading to tooth extractions. It is helpful to have knowledge of dental practices in your area that are teen friendly to increase adherence to such referrals. Furthermore, dental offices can reinforce prevention through education and follow-up reminders for routine care.

## DENTAL SEALANTS

Dental sealants are plastic resin materials applied to the chewing surfaces of the molars to prevent pit and fissure caries. The American Dental Association (ADA) recommends sealant application for children's and adolescents' permanent teeth because the percentage of noncavitated carious lesions is significantly reduced for as long as 5 years after sealant placement. (11) The Community Services Preventive Task Force (CSPTF) strongly recommends school-based sealant delivery programs because of their efficacy in reducing caries by 81%. (12) Currently, only 43% of adolescents in the United States have had 1 or more dental sealants placed. (6) This is another important reason to help adolescents and their families establish personalized dental homes.

## FLUORIDATION

Fluoridation continues to be the most effective and economical caries prevention measure. In children and

## TABLE. Resources

Oral Health Learning Modules/Resources for Health Providers:

1. Smiles for Life: <http://www.smilesforlifeoralhealth.org>
2. American Academy of Pediatrics PACT training: [http://www2.aap.org/oralhealth/pact/ch13\\_intro.cfm](http://www2.aap.org/oralhealth/pact/ch13_intro.cfm)
3. American Academy of Pediatrics fluoride varnish reimbursement by state: <http://www2.aap.org/compmpeds/dochs/oralhealth/advocacy.html>
4. Dental Health Initiative of San Diego: Teen Dental Health Training Curriculum: <http://www.sharethecaredental.org/website/resources/manuals.html>

Patient Education Materials:

1. American Academy of Pediatrics Oral Health Practice Tools: <http://www2.aap.org/compmpeds/dochs/oralhealth/PracticeTools.html>
2. American Dental Association Teen Oral Health: <http://www.mouthhealthy.org/en/Teens/concerns/>
3. American Dental Hygienist Association Proper Oral Health Care for Adolescents: [https://www.adha.org/resources-docs/72510\\_Oral\\_Health\\_Adolescents\\_Fact\\_Sheet.pdf](https://www.adha.org/resources-docs/72510_Oral_Health_Adolescents_Fact_Sheet.pdf)

adolescents, community water fluoridation decreases tooth decay by 29% to 51%. (1) Moreover, every dollar spent on community water fluoridation saves \$8 to \$49 in caries treatment costs or \$4.6 billion annually. (13) However, only 72.4% of US communities have fluoridated community water supplies. (14) The CSPTF reports there is no evidence that community fluoridated water causes significant dental fluorosis (mottling of teeth because of high intake of fluoride). (15) Teens who do not live in communities with fluoridated water should receive fluoride prescriptions (1 mg daily) up to age 16 years according to the ADA and the American Academy of Pediatrics (AAP). (16)

Fluoride varnish is a high concentration of fluoride brushed onto teeth, which dries with contact with saliva and stays on for 24 to 48 hours. Fluoride varnishes have practical advantages such as easy application, nonoffensive taste, and use of smaller amounts of fluoride than required for gel or foam applications. A Cochrane systematic review of 13 trials focusing on children and adolescents with permanent teeth found that young people treated with fluoride varnish experienced on average 43% reduction in caries. (17) The results suggest that a quick and simple application of fluoride varnish 2 to 4 times a year by a primary care provider can reduce the risk of caries. Health care providers can easily learn this skill (Table). Some states reimburse medical providers for fluoride varnish application for adolescents with Medicaid (eg, Georgia, Massachusetts); providers can check on rules in their state on the AAP website (Table). (Note: All children are covered up to age 6 years under

the Affordable Care Act for fluoride varnish application by their physician.)

It is also recommended that children, adolescents, and adults brush twice daily with fluoridated toothpaste. The fluoride in toothpaste is taken up directly by dental plaque and demineralized enamel. (18)

## ORTHODONTIC CARE

Although orthodontic wear is uncomfortable, many teens endure braces as a necessary inconvenience to achieve attractive teeth. (5) Maintaining oral hygiene is a struggle for most teenagers and adding the extra care that is needed while having braces is even more challenging. When oral care at home is not adequate, plaque can develop around the brackets of the braces, which may lead to poor aesthetic outcomes and caries that require restorative treatment. (19)

Regular patient motivation sessions and teeth cleanings by a professional dental hygienist can help maintain good oral hygiene during fixed orthodontic treatment. (19) One should not assume that patients with orthodontic treatment receive regular cleanings by a dental hygienist. Showing photographs of severe consequences of poor oral hygiene during orthodontic treatment appears to be effective. (20)

## NUTRITION

It is well known that proper nutrition helps children grow and healthy eating reduces the risk of developing obesity and type 2 diabetes. Poor diets that are high in carbohydrates and fats increase the risk for chronic disease including dental caries. According to the CDC, empty calories from added sugars and solid fats contribute to 40% of daily calories in children of ages 2 to 18 years and half of these calories come from sodas, fruit drinks, dairy desserts, grain desserts, and pizza. (21) American 12- to 19-year-olds drink an average of 14 to 22 ounces of a full-calorie soda daily. (21) Not only do the sugars in these drinks lead to tooth decay via oral flora, metabolizing the sugars to an acid byproduct, but the phosphoric acid found in sodas can directly damage teeth by also lowering the pH, allowing the teeth to demineralize.

Adolescent sports drink consumption has tripled in recent years. (22) Marketing of these drinks and energy drinks has been increasingly geared toward children and teens as a healthier alternative to sodas. (22) However, the benefits of sports drinks are mainly for individuals who perform prolonged vigorous activity in hot or humid weather. Sports drinks can contribute to caries

formation because of the sugar and acid content. Saliva helps to neutralize acid and encourages remineralization of teeth; however, during vigorous exercise, saliva production is less and therefore a dry mouth combined with consumption of sports drinks may increase tooth erosion. (22)

Adolescents should be encouraged to drink water rather than sodas, sports drinks, energy drinks, or fruit juices. Nutritional counseling is beneficial to help teens make better choices. It may also be useful to educate teen athletes that simple sugars and junk food (eg, donuts, cookies) are not enough to maintain energy for playing sports and can lead to weight gain as well. (23)

Lastly, adolescence can be a time when eating disorders emerge. Clinicians should suspect purging behavior if a patient is suffering from rampant decay or enamel erosion caused by gastric acid breaking down the tooth's outer surface. Patients require a comprehensive approach including behavioral interventions as well as a dental referral. The dental team may recommend rinses after vomiting to rid the mouth of acid, use of high-concentration fluoride toothpastes, and more frequent visits to the dentist.

## TRAUMATIC SPORTS-RELATED ORAL INJURIES

Approximately 45 million adolescents and children in the United States participate in organized sports programs. (24) Sports accidents account for 10% to 39% of all dental injuries in children. (25) All sporting activities have the potential risk for orofacial injuries. In the 13- to 17-year-old age group, basketball has the highest incidence of sports-related dental injury, with 50% to 90% of dental injuries involving the maxillary incisors. (26) The consequences of oral injuries in an adolescent are profound, including the need for oral surgical interventions, abscesses with tooth loss, dental crowding, or gaps in the mouth. These may in turn affect psychosocial well-being, speech, and nutrition from chewing problems.

A survey found that 67% of parents reported that their children did not wear mouth guards during organized sports activities and the same study found that 84% of parents stated that their child did not wear a mouth guard because it was not required. (26) Surveys of parents show that they do not completely understand the benefits of mouth guards and players may believe that mouth guards are not "cool" and are uncomfortable to wear. (26)

Although the Academy of Sports Dentistry recommends mouth guards during all sports play, the National Federation of State High School Associations only requires

mouth guards for football, ice hockey, lacrosse, field hockey, and for wrestlers with braces. Mouth guards can reduce the risk of injury by absorbing the energy at the site of oral impact and redistribute the remaining energy. (25)(26) Three types of mouth guards are available: the custom-fabricated mouth guard that is the most expensive but most comfortable and thereby most likely to be worn; “boil and bite” mouth guards made of thermoplastic material that can be molded to the mouth by finger or tongue after immersing the product in boiling water; and inexpensive stock mouth guards that cannot be molded. (25)

Education about mouth guards for parents and players who participate in organized sports that carry orofacial injury risk is beneficial. Teens should be given the options of different styles, colors, and types of mouth guards because aesthetics and comfort are important at this age and may contribute to adherence. This may also be an opportunity for providers to advocate at a community level through schools and medical organizations for expanded mandatory mouth guard use.

## TOBACCO AND NICOTINE USE

Different forms of tobacco have different effects on the oral cavity. A quarter of all high school students report some form of tobacco use “within the past 30 days.” (27) Although cigarette use has declined in the United States, 9.2% of high school students are smoking. The use of e-cigarettes for young people is rapidly increasing. (28) E-cigarettes have been shown in teens to lead to more smoking of regular cigarettes. (29) Meanwhile, approximately 3.2% of people aged 12 years and older (8.2 million people) in the United States use smokeless tobacco and almost half of the new users in this category are younger than 18 years. (30) Chewing tobacco and smoking cigarettes are clearly associated with oral cancers. A new popular form of smokeless tobacco is snus. Snus consists of small amounts of moist tobacco in individual prepackaged pouches that are placed inside the lip and do not require spitting. Snus does not increase the risk for lung or mouth cancer but users are twice as likely to develop pancreatic cancer and users have a 40% increased risk of death from cardiovascular disease and strokes. (31) Adolescents who use smokeless tobacco are more likely to engage in smoking and to participate in other risk-taking behaviors (ride with a driver who has been drinking alcohol, engage in binge drinking, and engage in sexual intercourse). (30)

With these risks in mind, a thoughtful patient-centered, motivational interview approach is needed to prevent and improve cessation rates of tobacco use. Probing to see what

aspects of the tobacco use most concerns the teen is the best approach. This may include bad breath, staining of teeth, being rejected by some friends, and affecting sports performance. A connection to more serious health conditions including cancer may have little impact on a teenager; however, this approach may be appropriate if the teen has a family member or a public figure (like a professional athlete) whom they admire who has suffered from such a condition due to tobacco use.

## ORAL PIERCINGS/GRILLS

Freedom of expression and individuality emerge during adolescence. A growing number of adolescents have an oral piercing which includes tongue, cheek, or lip piercings. Even when performed by a licensed piercer, oral piercings carry significant risk to oral and systemic health. Swelling is common after piercings and healing after tongue piercings can be slow and complicated. In rare cases, the tongue can swell enough to block the airway. (32) Bleeding and nerve damage are other potential risks. According to the National Institutes of Health, blood-borne infections such as hepatitis B, C, D, and G can also be transmitted through oral piercings. (32) Other infections can invade the wound and cause a systemic infection, which may lead to endocarditis. (32) Moreover, the jewelry can lead to problems with metal hypersensitivity, accidental choking from loose jewelry, tooth chipping and fractures, and periodontitis from jewelry rubbing along the gum line causing gingival damage. (33)

Approaching adolescents with oral piercings should involve education of the potential risks and proper oral care. Patients should be advised to call their physician or dentist if there are any signs of infection, avoid clicking the jewelry on teeth, remove jewelry when playing sports (if possible), keep the site clean of debris, and consider removing the jewelry completely. (23) Teens will likely respond to an open discussion about proper care and risks rather than judgment about their choices. Motivational interviewing may help to prevent piercings in the first place. If a teen has decided to obtain a piercing, he or she should be directed to reputable and licensed locations.

With more celebrities wearing grills (metal jewelry worn over teeth), it is not surprising that some teens are now wearing them. There are no studies indicating that grills are harmful. (34) However, patients should be advised to take the grills off when eating or playing sports, watch for hypersensitivity to metal, limit the amount

of time it is worn, and continue brushing and flossing teeth. (34)

### APPROACHING ADOLESCENTS ABOUT ORAL HEALTH

Making oral health discussions a routine part of the annual physical can help pinpoint problems and facilitate referrals to a dental provider as needed. Discussion about nutrition is a way to also integrate oral hygiene questions. Questions about physical activity can include questions about mouth guards in adolescents who engage in sports. Asking these questions as a routine part of the history gathering rather than during the oral examination can decrease awkwardness for the clinician and teen patient.

A thorough oral examination including lifting the lip to expose the teeth and gums will give better insight into the patient's oral hygiene. Advising teens about oral care is likely most effective when focused on the present rather than the future. Practicing good oral hygiene, improving diet, and wearing protective gear can enhance physical appearance and self-esteem. Debunking myths such as genetic predisposition to caries and poor dentation can show teens that they are in control of their own health. Moreover, teens would probably appreciate that good oral hygiene will give their parents one less thing to complain about.

## Summary

- Based on strong research evidence:
  - Fluoride varnish should be applied in the medical setting twice per year for children and adolescents. (17)
  - The use of an electric toothbrush is more effective at reducing plaque and decreasing gingivitis in older teens and adults. (10)
- Based on some research evidence as well as consensus:
  - Community water fluoridation reduces caries. (1)
  - Fluoride supplements should be offered to adolescents (up to age 16 years) who do not have access to community fluoridated water. (16)
  - The use of sealants on permanent teeth reduces caries significantly. (11)
- Based primarily on consensus due to lack of relevant clinical studies:
  - Adolescents should brush twice daily with a fluoridated toothpaste and floss daily. (8,9)
  - The use of mouth guards for sports reduces oral injuries. (25)
  - Oral piercings can lead to local complications including infection and chipped teeth. (33)
  - Adolescents who use smokeless tobacco are more likely to engage in smoking and to participate in other risk-taking behaviors. (30)

*References and Suggested Readings for this article are at <http://pedsinreview.aappublications.org/content/38/2/61>.*

## Parent Resources from the AAP at HealthyChildren.org

- Diet Tips to Prevent Dental Problems: <https://www.healthychildren.org/English/healthy-living/oral-health/Pages/Diet-Tips-to-Prevent-Dental-Problems.aspx>
- Dental Health and Orthodontic Problems: <https://www.healthychildren.org/English/healthy-living/oral-health/Pages/Dental-Health-and-Orthodontic-Problems.aspx>
- Dental Emergencies - What Parents Need to Know: <https://www.healthychildren.org/English/health-issues/injuries-emergencies/Pages/Dental-Emergencies.aspx>

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1. You are asked to lead a seminar on adolescent oral health for a group of pediatric residents. Your assigned references include appropriate websites that discuss the epidemiology of oral disease and access to dental care and also demonstrate proper examination techniques, pathologies, and office preventive measures. At the start of the seminar, your first question focuses on adolescent dental health and access to dental care in this country. Which of the following is an accurate statement that best describes the reality of adolescent oral health in the United States?

- A. Adolescents have a much lower prevalence of gingivitis than do adults.
- B. Fifteen percent of adolescents have untreated decay.
- C. Medicaid ensures access to dental care for all adolescent enrollees.
- D. Periodontitis is rare among adolescents.
- E. The prevalence of untreated caries is lowest among black and Hispanic teens.

2. You are asked to discuss measures that promote oral health with a group of parents at your local middle school. Which of the following statements best describes the evidence-based facts related to prevention and management of dental caries in teens?

- A. All communities in the United States now have fluoridated water.
- B. Dental visits are required to ensure oral hygiene and promote oral health.
- C. Scheduled application of varnish by a primary care provider reduces the risk of caries.
- D. School-based sealant application is of uncertain value.
- E. Twice weekly use of an electric toothbrush is sufficient to eliminate plaque.

3. A 17-year-old girl for whom you have provided care since birth comes in for a health maintenance examination. You last saw her 3 years ago. She states she has been well. She does not participate in organized sports, but takes frequent walks. Her body mass index is 16. Your records show her previous oral health to be unremarkable, but she now has widespread erosion of enamel and several obvious deep cavities. Which of the following possible explanations for the significant deterioration of her oral health should you be most concerned about?

- A. A diet high in pizza and donuts.
- B. Purging behavior.
- C. Excessive intake of sodas.
- D. Excessive intake of sports drinks.
- E. Failure to brush regularly.

4. A freshman trying out for his high school basketball team comes in for a sports physical. He has never played organized sports before. His oral health is excellent. His dentist has never identified any caries. He inquires about the need to wear mouth guards and asks your opinion. Which of the following is the best sports counseling recommendation to protect his teeth from injury?

- A. Any type, because mouth guards are required for all organized high school sports today.
- B. Custom-fabricated mouth guard.
- C. Mouth guards do not need to be worn during practice, but only during competition.
- D. No mouth guard is needed because the risk of injury to teeth in basketball is very low compared with other sports.
- E. Unmoldable mouth guard.

5. You are asked to address a high school assembly on the risks of smokeless tobacco and oral adornments such as piercings and grills. Which of the following strategies is the most effective method for influencing adolescents to choose positive behaviors?

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- A. Emphasize the high risk of chronic hepatitis C from tongue piercing.
  - B. Focus on motivations behind such choices, possible benefits, immediate adverse effects.
  - C. Highlight that the smartest teens never even consider such things.
  - D. Share the proven risk of damage to teeth from the use of grills.
  - E. Stress the high risk of immediate death from tongue piercing.
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