

A Best Practice Approach Report describes a public health strategy, assesses the strength of evidence on the effectiveness of the strategy, and uses practice examples to illustrate successful/innovative implementation.

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Best Practice Approach Prevention and Control of Early Childhood Tooth Decay

- I. Description (page 1)
- II. Guidelines and Recommendations (page 20)
- III. Research Evidence (page 23)
- IV. Best Practice Criteria (page 25)
- V. State Practice Examples (page 26)
- VI. Acknowledgements (page 28)
- VII. Attachments (page 30)
- VIII. References (page 33)

Summary of Evidence Supporting the Prevention and Control of Early Childhood Tooth Decay

Research	++
Expert Opinion	+++
Field Lessons	++
Theoretical Rationale	+++

See **Attachment A** for details.

I. Description

A. Significance of Oral Health and Primary Teeth for Young Children

➤ *Why is oral health and “baby teeth” important for young children?*

Early childhood is a time of significant physical growth and development. During this period, many changes occur in the mouth of a young child (infant, toddler and preschooler). The mouth provides and supports important bodily functions from the moment of birth and throughout the lifespan, which include breathing, eating/digestion, communication, and biological/physical protection. The mouth has hard structures (such as the teeth and supporting bone) and soft structures (such as the tongue and lining tissue of the mouth), which work together in many ways. A healthy mouth is an important contributor in developing positive self-esteem, which helps young children reach their potential in life. A healthy mouth for a young child is a cornerstone for life-long health and well-being.

A child’s first set of 20 teeth called primary or baby teeth usually erupt from six months to three years of age. These primary teeth are gradually replaced with 32 adult or permanent teeth that commonly erupt between 6 and 21 years of age.¹ Primary teeth are as important as permanent teeth because they:

- allow children to bite and chew food;
- are critical for proper speech development;

- aid in the development of the facial bones and muscles;
- hold space for the permanent teeth and help guide them into position.

B. Oral Diseases and Conditions

➤ *What is included in oral diseases and conditions?*

Disease, trauma and developmental defects can occur in the mouths of young children. One of the most prevalent and most common diseases found in young children is dental caries, which refers to both the destructive disease process leading to a cavitation of a tooth and the resulting condition of the tooth. Dental caries is often called “tooth decay” or “cavities.” Though it is an infection that is transmissible from parents and other caregivers, dental caries are preventable and manageable. If tooth decay starts before six years of age, it can be particularly damaging to the teeth and compromising to the child’s well being. For the oral health of young children, preventing tooth decay in primary teeth must be a major goal for parents/caregivers and the community.

Childhood injuries are another major concern since up to 30 percent of children injure their primary teeth.² The consequences of oral injury include pain, infection, damaged bone and soft tissue, loose/discolored teeth, impaired speech, and high treatment costs that may extend over several years. Prevention involves sharing and modeling safe behaviors for children and counseling parents/caregivers how to respond to oral injury, such as managing a dislodged tooth. Oral injury can be an important marker for child abuse and neglect.³

There are other oral and dental diseases/conditions that affect young children, such as cleft lip and/or palate, malformed teeth, poorly aligned teeth and bite, lesions from oral infections and early gum disease. This report will focus on preventing and controlling early childhood tooth decay because it is such a common and demanding problem for families, health care and dental providers, and communities. Further discussion on the importance of perinatal oral health care (the period around childbirth) is planned for a future report.

C. Tooth Decay in Early Childhood

1. “Early Childhood Caries”

➤ *What is “early childhood caries?”*

Many names have been used for tooth decay in young children, such as baby bottle mouth and nursing bottle syndrome. In 1999, three federal agencies convened an expert workshop to establish diagnostic and reporting criteria for this disease for use in research. The term “early childhood caries” (ECC) was adopted as the standard name for the “the presence of one or more decayed non-cavitated or cavitated, missing due to caries, or filled tooth surfaces in any primary tooth” of a child 71 months of age or younger.⁴⁻⁶ ECC is decay in any “baby tooth” of a child younger than age six. The term “severe early childhood caries” (S-ECC) was also adopted for the more extensive form of the disease. Despite the wide use of the term ECC in the dental community, communications to the public and policy makers have used terms such as baby bottle tooth decay, baby bottle caries, and dental cavities in the teeth of preschoolers.⁶

2. The Disease Process

➤ *What causes tooth decay?*

Tooth decay (dental caries) is caused by certain bacteria. These bacteria together with food particles and mucus are found in dental plaque, a soft and sticky substance that builds up on teeth. Infants are first infected with bacteria that cause tooth decay through saliva, typically from the mother or primary caregiver. Frequent ingestion of sugar and poor dental hygiene will allow bacteria to grow. The bacteria ingest sugar and produce acid that dissolves tooth structure, resulting in tooth decay. When a tooth surface is first damaged by acid, it appears as a “white spot.” Further acid damage breaks down tooth structure and leads to a cavity in the tooth. If the disease process is left unchecked, the bacteria will advance into the nerve and blood vessels of the tooth further advancing the infection. Since the dental enamel (the harder outer layer) of a primary tooth is thin, tooth decay can progress rapidly in a child.

A young child’s exposure to excess sugary liquids during bottle feeding, and habits such as dipping a pacifier in honey, corn syrup or “jello water,” can increase his/her risk for tooth decay. Allowing a child to use a bottle continuously throughout the day or sleeping with a bottle can also lead to advanced decay. For a preschooler who no longer uses a bottle, a diet with high intake of sugars, especially for prolonged periods of time, continues the risk of caries.

3. The Burden of Disease

➤ *How extensive is the problem of tooth decay?*

➤ *What are the costs for treating tooth decay?*

In the United States, tooth decay is the most prevalent chronic disease of childhood, five times more common than asthma.⁷ For the period 1999-2004, 28 percent of 2-5 year-olds had experienced tooth decay. This represents a significant 15 percent increase compared to the same age group of children during 1988-1994.⁸ Tooth decay can progress with age if risk factors are not addressed: 11 percent of two year-olds have tooth decay and by age five, 44 percent have tooth decay.⁹

Oral health disparities exist among U.S. children. Approximately 80 percent of tooth decay is found in 25 percent of children, primarily children from low-income families.^{8,10} Preschoolers living in poverty are twice as likely to experience tooth decay and twice as likely to have dental pain compared to preschoolers from families living above the federal poverty level (FPL).¹¹

Dental care is the most common unmet health need in children, especially children with special health care needs (e.g., with developmental disabilities). More than 20 percent of 2-5 year-olds have untreated tooth decay.⁸ The greatest need for dental care services is among children from low-income and minority families.¹² Children under age 6 receive less than half the dental care services as children ages 6-12 (25 vs. 59 percent).¹²

Research confirms the high costs of treatment for tooth decay, especially in young children requiring hospitalization and general anesthesia for dental management. Cost analysis of prevention has shown significant cost-savings.¹³⁻¹⁵ A comparison of state

Medicaid reimbursements for dental care provided in a hospital's emergency room (ER) to recommended preventive care if provided in a dental office for the same child, showed that ER cost is approximately ten times more than the cost of ECC preventive care (\$6,498 vs. \$660).¹⁶ Medicaid-enrolled preschool children who had an early preventive dental visit were more likely to have additional preventive services and have lower overall dental costs.¹⁷

Many children hospitalized for dental surgery experience recurrence of tooth decay because the underlying risk factors and disease process are not adequately addressed. One study shows 40 percent of ECC patients relapsed, experiencing tooth decay within the first year after dental surgery.¹⁸ Furthermore, an eight-year study of children ages three to five found that children having tooth decay in their primary teeth were three times more likely to develop decay in their permanent teeth.¹⁹

4. Barriers to Achieving Optimal Oral Health

➤ *What contributes to the problem?*

Young children and their families can encounter barriers that prevent them from attaining optimal oral health. They often experience difficulties in accessing and utilizing professional dental care. Developing solutions involves addressing the following barriers.

Barriers to attaining oral health during early childhood:

- Failure to prevent, limit or delay the transmission of bacteria that cause tooth decay.
- Frequent and high intake of sugar.
- Less than optimal exposure to fluorides to prevent tooth decay.
- Failure to detect tooth decay before the disease process leads to extensive damage to the teeth.
- Cultural, social and economic influences on oral health such as dietary practices home care and beliefs about primary teeth.²⁰

Barriers to accessing and utilizing professional dental care:

- Lack of dental insurance.²¹⁻²⁴
- Lack of dentist participation in Medicaid.^{22,25,26}
- An insufficient number of pediatric dentists to care for young children with severe dental needs.²⁷
- Lack of other dental workforce models.²⁸⁻³¹
- Limited dental safety net services, capacity and infrastructure, particularly acute for young children.
- Lack of financing that supports prevention and dental disease management.^{32,33}
- Low value/priority placed on regular dental visits for preventive care.

5. Consequences of Early Childhood Tooth Decay

➤ *What are the consequences of tooth decay in early childhood?*

The consequences of tooth decay in early childhood involve the tooth, mouth and child. Tooth decay leads to the destruction of tooth structure and if untreated for an extended

period of time, can progressively lead to pain, infection (dental abscess and facial swelling), tooth loss, and malocclusion. Pain and swelling can limit a child's ability to eat and speak, distract a child from learning and playing, and increase the number of days with restricted activity or being absent from school. Tooth decay can have consequences that hinder a child's physical growth and quality of life. Studies have found that severe ECC may keep toddlers from reaching normal height and weight and may compromise their general health and ability to thrive.³⁴⁻³⁹ Furthermore, dental infections are a risk for medical complications, especially for children who are the least able to afford or access professional care. In rare cases, untreated dental caries has led to life-threatening infection and death.⁴⁰

In addition, families, communities and the health care system are strained in coping with ECC consequences. **Attachment B** shows a proposed ECC morbidity and mortality pyramid that includes parental and family stress, loss of work time, and added health costs related to disease management.³⁹ The attention of health care professionals, regulatory and child advocacy agencies, public health officials, and legislators is needed to address this public health problem.

D. An Overview of a Strategic Framework to Prevent and Control Early Childhood Tooth Decay

- *What is the “big picture” for preventing and controlling tooth decay in early childhood?*
- *What are focus areas to prevent and control tooth decay in early childhood?*

1. Strategies to Prevent and Control Early Childhood Tooth Decay

Strategies to prevent and control early childhood tooth decay should address the dental disease, systems of care that support children during their early developmental years, and public health practices.

For the preventing and controlling the dental disease, strategies should:

- **Stop/delay the onset of tooth decay in the primary teeth.** This requires primary prevention that begins with the mother and seeks to reduce her bacterial load or control her transmission of the bacteria that causes tooth decay before, during and after her pregnancy. Prevention includes assessing a child's risk for tooth decay.
- **Identify and recognize early signs of tooth decay.** Observing signs of tooth decay such as “white spots” will allow early use of measures to arrest decay and minimize subsequent treatment.
- **Treat tooth decay early.** Professional care is needed to arrest the disease at the earliest “white spot” phase to prevent further damage. If caries has progressed (e.g., resulting cavities), restore damaged teeth to proper form, function and esthetics.
- **Prevent new and recurrent tooth decay.** If prevention and restorative treatment do not manage the underlying disease process, a child is likely to experience new and/or recurrent caries. Addressing risk factors prevents decay in new and restored areas of the teeth.

For promoting systems of care, strategies should:

- **Provide an adequate and competent workforce** to promote early childhood oral health and manage all stages of tooth decay. Trained professionals at all levels are

needed to assess risk, identify tooth decay, manage the disease process, manage a young child's behavior for safe treatment, and deliver care to restore oral health.

- **Integrate oral health and coordinate dental care services** with care systems supporting young children (e.g., medical, developmental and educational systems). Professionals working in these systems can help identify those at risk and facilitate early preventive/restorative dental care.

For developing public health practices, strategies should:

- **Utilize population-based approaches.** The Institute of Medicine noted that public health “is what we, as a society, do collectively to assure the conditions for people to be healthy.”⁴¹ Public health focuses on the health of the population rather than individuals,⁴² such as obtaining a high level of oral health throughout society. Population-based approaches use a community perspective, population-level data and evidence-based practices, with an emphasis on prevention and effective outcomes.⁴³ Community water fluoridation (a population-based strategy to prevent tooth decay) is recognized by Centers for Disease Control and Prevention (CDC) as one of the ten great public health achievements in the 20th century. Population-based interventions complement individual interventions (e.g., use of community water fluoridation and fluoridated toothpaste). Population-based approaches should strive to achieve national, state or local oral health objectives.
- **Promote public and private partnerships.** Determinants of health are the province of many governmental agencies (e.g., agencies concerned with health and child welfare)⁴² and many non-governmental institutions (e.g., managed care organizations, community-based groups, and academic institutions). The National Call to Action to Promote Oral Health acknowledges the need for public-private partnerships at all levels of society.⁴⁴ For example, public-private partnerships are needed to raise the public profile on the epidemic of tooth decay and its consequences among vulnerable children/families, and leverage communities to address the problem.
- **Respond to emerging issues.** Public health practice needs to be responsive to emerging issues that impact early childhood oral health. These issues at times demand urgent attention or action, and may support or threaten current practices. For example, the National Research Council's report on fluoride in drinking water raises the possibility that infants could receive a greater than optimal amount of fluoride in baby formula mixed with water containing fluoride;⁴⁵ this led to the American Dental Association (ADA) releasing an [Interim Guidance on Fluoride Intake for Infants and Young Children](#).⁴⁶

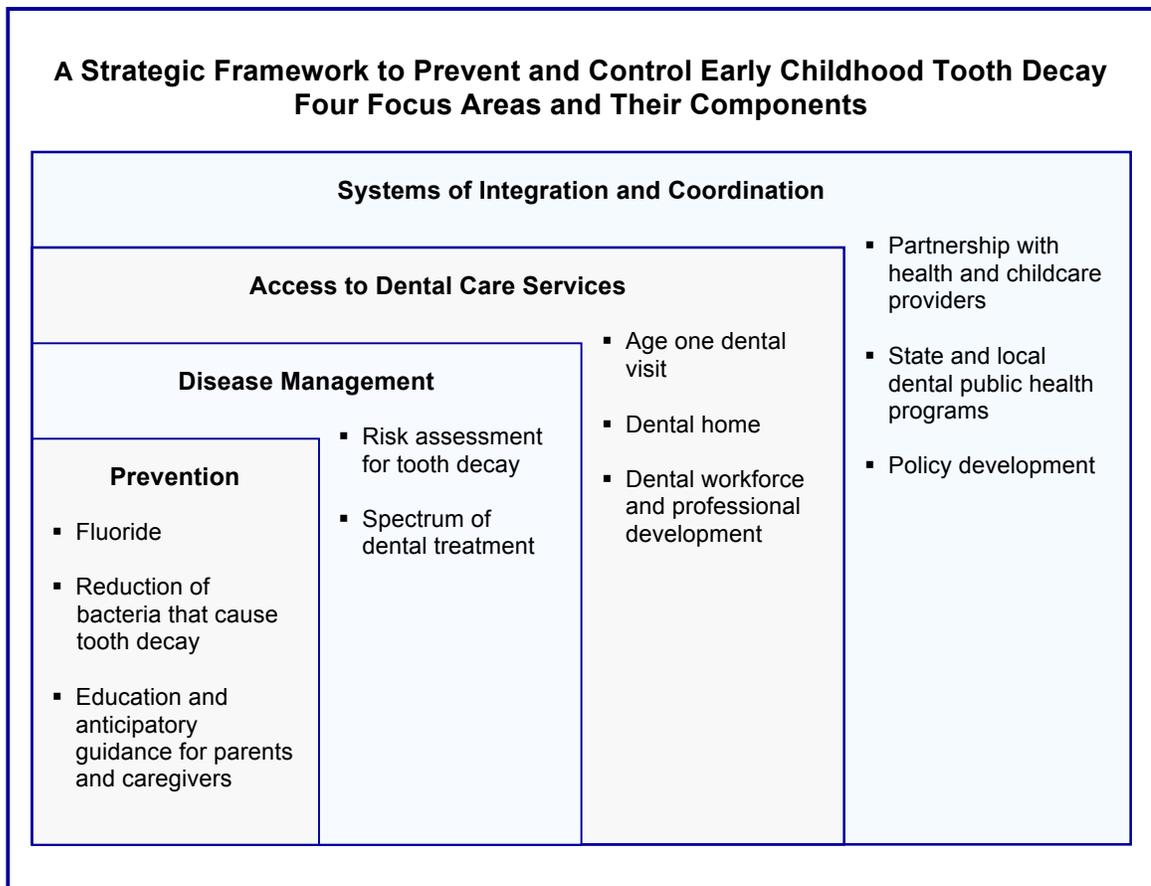
2. A Conceptual Model of the Influences on Children's Oral Health

Fisher-Owens and colleagues proposed a model showing a range of factors that influence children's oral health (see **Attachment C**).⁴⁷ The conceptual model provides a reference to better understand a strategic framework to prevent and control early childhood tooth decay. This model recognizes several levels of influences on children's oral health and shows that **child, family and community levels of influences** interact with biological factors in oral health (teeth, bacteria, and diet that cause tooth decay). At each level of influences, there are **five key domains that are determinants of health**: (a) genetic and biological factors, (b) the social environment, (c) the physical environment, (d) health behaviors, and (e) dental and medical care. The domains illustrate the complex interplay of factors that determine oral health. Also, the aspect of

time is incorporated into the model because dental disease and the influences on a child change over time. This model, with its list of determinants for children’s oral health, can assist in planning and implementing strategies, developing policies, conducting research, and allocating resources to improve early childhood oral health.

3. A Strategic Framework to Prevent and Control Early Childhood Tooth Decay

A strategic framework is proposed to prevent and control tooth decay in early childhood and the figure below provides an overview. Rooted in the conceptual model described above, the framework guides efforts to prevent and manage tooth decay in early childhood and supports the development of best practices. The strategic framework has four focus areas: (1) Prevention, (2) Disease Management, (3) Access to Dental Care Services, and (4) Systems of Integration and Coordination. The four focus areas are tied to the child, family and community levels of influences on children’s oral health. The components of each focus area also relate to the conceptual model’s five domains that determine health.



E. Components of the Strategic Framework to Prevent and Control Early Childhood Tooth Decay

➤ *What components of the strategic framework can guide efforts to prevent and control tooth decay in early childhood?*

1. Prevention

Actions can be taken by families, communities, and policymakers to prevent tooth decay and delay its onset.

Fluoride

Fluoride prevents and slows the progression of tooth decay and can even reverse very early tooth decay. Topical fluoride results in a small, elevated and prolonged fluoride level in saliva and dental plaque, bringing fluoride in contact with tooth surfaces. This prevents tooth decay by: (a) facilitating the hardening of the tooth surface (remineralization); (b) improving the ability of the tooth surface to resist acid attack that breaks down tooth structure (demineralization); and (c) inhibiting bacterial enzymes, which reduces the ability of the bacteria to grow, metabolize sugar and produce acid.⁴⁸ When fluoride is swallowed and ingested during the time of tooth development (up to seven years of age), the fluoride is incorporated into tooth structure and makes the teeth more resistant to acid attack. Fluoride that is swallowed increases plasma fluoride levels, which raise the fluoride levels of fluids surrounding erupted and unerupted teeth, contributing to a topical effect.⁴⁹

Prevention
<ul style="list-style-type: none">▪ Fluoride▪ Reduction of bacteria that cause tooth decay▪ Education and anticipatory guidance for parents and caregivers

Sources of fluoride include drinking water with optimal levels of fluoride and use of products such as fluoride varnishes, gels, toothpastes, mouthrinses, and supplements:⁵⁰

- **Water fluoridation** is an effective, safe, and low-cost way to prevent tooth decay as documented by decades of research. The low levels of fluoride in drinking water allow for frequent ingestion. Water fluoridation provides exposures to fluoride for unerupted and erupted teeth. Community drinking water systems are adjusted to the optimal level of fluoride for preventing tooth decay, 0.7-1.2 mg/L or 0.7-1.2 parts per million (ppm).⁵¹ Approximately 72 percent of the U.S. population is served by community water systems with optimally fluoridated water in 2008; the national Healthy People objective is to reach 79.6 percent by 2020.⁵² The Association of State & Territorial Dental Directors (ASTDD), along with a large diverse group of other national organizations, fully supports and endorses community water fluoridation.
- **Fluoride varnish** has increasingly become a common method for professionals to provide fluoride to young children for ECC prevention because of safety (premeasured dose and reduced ingestion) and better acceptance by children. An increasing body of evidence indicates that fluoride varnish is effective in caries prevention, a practice endorsed by the ADA, ASTDD, and American Association of Public Health Dentistry (AAPHD).⁵³⁻⁵⁹ Fluoride varnish (with 22,600 ppm fluoride) is easily applied with a small brush on tooth surfaces, does not require special preparation of the teeth, and quickly sets and sticks to the tooth surface until removed by repeated toothbrushing. In addition, fluoride varnish can also reverse

early tooth decay.⁵³ About 50 percent of states have initiated fluoride varnish programs for high-risk children in clinical sites⁶⁰ as well as in Head Start programs and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) sites.

- **Fluoride gel** applications are mostly delivered in dental offices by dental professionals, generally at intervals of 3 to 12 months. The professionally applied products have 9,040-12,300 ppm fluoride.
- **Toothpastes** sold in the U.S. contain 1,000-1,500 ppm fluoride. Children under age two years should not use fluoride toothpaste unless instructed by a dentist or health professional. Children starting at age two should use fluoride toothpaste. Parents need to place only a small smear or pea-size amount on the toothbrush, as young children may like the taste of the paste and tend to swallow it.
- **Fluoride mouthrinses** (over-the-counter solutions have 230 ppm fluoride) are not appropriate for very young children who have not matured enough developmentally to be able to swish and spit without swallowing the rinse.
- **Dietary fluoride supplements** (tablets, drops or lozenges) are available only by prescription and are intended for use by children ages six months to 16 years living in non-fluoridated areas.⁶¹ To maximum the benefits of supplements and increase contact with tooth surfaces, sucking or chewing fluoride tablets or lozenges prior to swallowing is recommended. Tablets and lozenges are manufactured with 1.0, 0.5, or 0.25 mg fluoride.

A child's caries risk (low, moderate or high) should be considered in determining the use of fluoride supplements and professionally applied topical fluoride treatment. Recent recommendations describe limited use of fluoride for low-risk children, but significantly more intensive regimes for high-risk children.⁴⁹ For example, low-risk children under age six living in a community with fluoridated water and using fluoride toothpaste may have adequate caries prevention without professionally applied topical fluoride and high-risk children may need the added benefits of fluoride varnish at 3- or 6-month intervals ([ADA clinical recommendations](#)).⁵⁸

Reduction of Bacteria that Cause Tooth Decay

The risk of tooth decay can be lowered by reducing the transmission of bacteria from the mother (or primary caregiver) to child:

- **Reduce the bacteria in the mouth of the mother or primary caregiver.** Evidence suggests that most young children acquire bacteria that cause tooth decay primarily from their mothers. Efforts to reduce the transmission of bacteria from mothers to children improve the likelihood of better oral health for the child. Reducing bacteria in the mouth of the mother or primary caregiver requires oral health education/counseling, preventive treatment, and home care. Practices may include using prescription mouthrinses to reduce bacteria, having professional dental care to eliminate existing oral infection and dental caries, and/or performing daily personal oral hygiene.
- **Minimize the transmission of bacteria that cause tooth decay.** Minimizing saliva-sharing activities between children and parents/caregivers limits bacterial transmission. Examples include avoiding the sharing of utensils, food and drinks, discouraging a child from putting his/her hand in the caregiver's mouth, not licking a pacifier before giving it to the child, and not sharing toothbrushes. The goal is to

prevent or delay children as long as possible from acquiring the bacteria that cause tooth decay.

Education and Anticipatory Guidance for Parents and Caregivers

Education is recommended for parents and other caregivers to increase awareness about the importance of maintaining good oral health by imparting knowledge, discussing questions or concerns, and developing realistic prevention strategies. Anticipatory guidance is the process of providing parents/caregivers with practical, developmentally-appropriate information about children's health related to significant physical, emotional, and psychological milestones.⁶² Discussion topics should include the causes and process of tooth decay, avoidance of saliva-sharing behaviors, appropriate fluoride intake for the child, recognizing early signs of tooth decay, bottle feeding, oral hygiene, dietary and oral habits, speech/language development, injury prevention, and the first dental visit. Pregnancy is an opportune time to educate/counsel expecting mothers about preventing ECC. This education should start as soon as the child's first teeth erupt.

As children age, they go through distinct developmental stages; it is important for parents and caregivers to understand the oral health needs of each stage as their child grows. The American Academy of Pediatric Dentistry (AAPD) has recommendations on anticipatory guidance, bottle feeding habits to prevent ECC, and infant/toddler oral hygiene care.^{4,62} Bright Futures, a national children's health promotion and disease prevention initiative, provides guidelines for health professionals that also include anticipatory guidelines for [Early Childhood](#) (age 1-4 years) and [Middle Childhood](#) (age 5-10 years). Furthermore, the [2009 Children's Health Insurance Program Reauthorization Act](#) (CHIPRA) establishes a requirement that parents of newborns be informed of risks for ECC, its prevention, and the need for the child to have a dental visit by age one.

Health literacy and cultural considerations are important when communicating with parents/caregivers and children. Recent estimates indicate that over 90 million Americans are unable to comprehend basic health information. Persons with low health literacy levels often have poor knowledge of health-related information, show little ability to control chronic diseases, and rarely maximize benefits from available preventive health services.⁶³ Resources exist that provide guidance on developing culturally competent messages using plain language when communicating with families (e.g., from [Centers for Disease Control and Prevention](#), [National Maternal and Child Oral Health Resource Center](#), [American Medical Association](#), [Harvard School of Public Health](#), and [National Network of Libraries of Medicine](#)).

Interventions for early childhood tooth decay need effective approaches in delivering health education and in modifying health behaviors. More input from behavioral scientists, social workers, and educators will be needed to maximize effective and culturally competent communication with families to promote healthy behaviors. It should be a public health and clinical goal to develop effective methods to inform the public at large and the parent/caregiver on an individual level about the nature of tooth decay in early childhood, its risk factors and disease process so that parents/caregivers will become intuitive about best interventions and take day-to-day actions that are protective for their young children.

2. Disease Management

When early prevention does not stop the onset of tooth decay, the disease will need to be managed with professional guidance. Disease management of ECC should minimize the severity of tooth decay and its consequences, reduce the need for extensive and costly treatment, and improve the quality of life for the child. This requires arresting the disease process, repairing damage from the disease, restoring oral health, and preventing recurrence of the disease.

Disease Management

- Risk assessment for tooth decay
- Spectrum of dental treatment

Risk Assessment for Tooth Decay

Numerous risk factors lead to tooth decay in a child. An early risk assessment identifying factors within the context of the child, family, community, and culture can help a child to achieve and maintain oral health. AAPD recommends every infant receive an oral health risk assessment from his/her primary health care provider or qualified health care professional by six months of age.⁶⁴ Dental and other health professionals are encouraged to utilize a risk assessment tool for tooth decay in their clinical care of young children.^{62,65} Such a tool determines the risk level for an individual child and guides the selection of appropriate interventions. Risk assessments of tooth decay should:

- identify risk factors including biological, behavioral and nutritional factors;
- clinically assess the disease process such as bacteria levels, dental plaque appearance, and frequency of simple carbohydrate (sugar) ingestion;
- be simple, inexpensive, and have high predictive values, sensitivity and specificity.

Caries risk assessment tools for an individual child include:

- the [Caries-Risk Assessment Tool \(CAT\)](#)⁶⁵ developed by the AAPD, which is based on a set of clinical, environmental and general health factors;
- the [Caries Management By Risk Assessment \(CAMBRA\)](#)⁶⁶ developed to assess the child's risk for tooth decay and determine appropriate preventive and therapeutic interventions; and
- the [ADA Caries Risk Assessment Form \(Ages 0-6\)](#)⁶⁷ developed as a practice tool for the dentists and a communication tool with the parent/guardian.

Continued support and advancement of caries risk assessment is demonstrated by: (a) The [American Academy of Pediatrics \(AAP\) Oral Health Initiative](#) providing a training module (Oral Health Risk Assessment: Training for Pediatricians and Other Child Health Professionals) to assist providers in using the CAT; (b) [The Center to Address Disparities in Children's Oral Health \(The "CAN DO" Center\)](#) at the University of California, San Francisco conducted a study to develop a risk assessment model for ECC; and (c) [The Center for Research to Evaluate and Eliminate Dental Disparities \(CREEDD\)](#) at Boston University also developed measures for caries-risk assessment in recent research to prevent ECC. Caries-risk assessment tools provide an active and dynamic method of assessment and should be used frequently to account for changes in a child's level of risk at different ages.

Monitoring health status to identify and solve community problems is an essential public health service, which⁶⁸ involves the identification of tooth decay risks and determination

of dental service needs. For public health, risk assessment of tooth decay focuses on the population, rather than the individual. Risk factors of tooth decay for a population include social and environmental factors, such as non-fluoridated community water systems and dental health provider shortage areas. The public health practice of assessment identifies the extent of the problem in a community and unmet needs, as well as underutilized resources or shortcomings of the service delivery system.⁶⁹ Public health risk assessment identifies population groups at risk to tooth decay, such as children from low-income or uninsured families, and direct resources for high-risk populations, such as a fluoride varnish program for Early Head Start and Head Start children.

Spectrum of Dental Treatment

Tooth decay is a progressive disease. The earliest visible signs often appear as a “white spot” on a tooth, eventually breaking down tooth structure leading to a “cavity” and finally advancing into the nerve and blood vessels of the tooth. In young children, how tooth decay is treated depends on many factors including at what stage it is first diagnosed, the number of teeth affected, the severity of decay, and the level of cooperation of the child. For “white spot” lesions, fluoride varnish applications and lifestyle modifications may be adequate treatment. For decay that has progressed to the cavity stage and beyond, traditional restoration and/or extraction of the teeth are generally appropriate.

Since tooth decay is an infectious disease, the potential use of antimicrobial agents to reduce the bacteria associated with the disease mirrors the approach used with other infectious diseases, but with some limitations as the mouth is also an external structure exposed to outside elements. An emerging area of clinical practice is the use of chemotherapeutic agents for caries prevention and as an adjunct to traditional dental treatment.⁷⁰ Treating tooth decay chemically is part of a paradigm shift in dental disease management. Chemotherapeutic agents interfere with the colonization, growth and metabolism of decay causing bacteria and should not decrease the ability of other agents to prevent caries.

Fluoride can be considered a chemotherapeutic agent. There has been some research on preventing tooth decay on young children using other agents such as chlorhexidine varnish, xylitol, povidone iodine, and silver diamine fluoride.⁷¹⁻⁷⁸ It is possible that in the future some chemotherapeutic agents will become a routine part of the management of tooth decay.

3. Access to Dental Care Services

Early childhood is an important time for a parent or caregiver and the child to access dental services (include counseling, prevention and treatment). The consequences of poor oral health at this time can have an impact throughout life. While children with public or private dental insurance are 30 percent more likely than uninsured low-income children to have a preventive dental visit in a year, insurance coverage alone does not assure access.⁷⁹ Medicaid covers a quarter of all children in the U.S., but only one-third of enrolled children see a dentist in a year.⁷⁹ Several factors influence the access of dental care among low-

Access to Dental Care Services

- Age one dental visit
- Dental home
- Dental workforce and professional development

income groups; the primary one is limited dentist participation in Medicaid.²⁶ Access to dental services is dependent on the support of parents, primary caregivers, health providers, and childcare professionals to coordinate a child's entry into dental care, and establish a dental home. An adequate and diverse dental workforce and an effective system to pay for professional dental services are also needed.

Age One Dental Visit

The American Association of Public Health Dentistry (AAPHD), American Academy of Pediatric Dentistry (AAPD), American Dental Association (ADA), American Academy of Pediatrics (AAP), and American Public Health Association (APHA) recommend that infants receive an oral evaluation within six months of the eruption of the first primary tooth, but by no later than 12 months of age. This evaluation is intended to assess and check for dental problems and educate parents/caregivers. An age one dental visit includes the following:⁶⁴

- record thorough medical/dental histories (mother, primary caregiver and infant);
- complete an oral examination and plan for comprehensive care in accordance with accepted guidelines and periodicity schedules for pediatric oral health;
- assess the infant's risk of developing caries and determine an appropriate prevention plan and interval for periodic reevaluation;
- provide anticipatory guidance regarding dental and oral development, fluoride status, non-nutritive sucking habits, teething, injury prevention, oral hygiene instruction, and the effects of diet on the dentition;
- refer patients to the appropriate health professional if intervention is necessary.

Dental Home

To achieve optimal oral health, children need professional dental care, which should start in infancy and continue over a lifetime.^{62,80} National organizations such as AAPD, AAP and Children's Dental Health Project (CDHP) support the concept of a dental home, which brings together the interaction of the child, parents, non-dental professionals, and dental professionals to deliver oral health care in a comprehensive, continuously accessible, coordinated, and family-centered way.⁸⁰ A dental home should emphasize prevention and disease management, as well as tailor care to meet individual needs for better health outcomes at lower costs. A dental home should also provide parental education and counseling including anticipatory guidance, and make necessary referrals to dental specialists.^{62,64,80} The age one visit can be the first step to establishing a dental home.

The National Oral Health Policy Center at CDHP analyzed the environment factors for the widespread adoption and implementation of the dental home.⁸¹ They concluded:

- The dental home will particularly benefit children whose risk for oral disease is exacerbated by social and/or medical vulnerabilities.
- Oral health promotion from an early age in a dental home will require extensive improvements in public awareness and professional engagement and systems-level improvements in care coordination between medicine and dentistry.
- Current dental system capacity cannot support wholesale implementation of the dental home unless the dental home's functions are shared by other agencies that interact with children where they live, learn, and play.

- The dental home concept holds greatest promise for impact if focused on the youngest children.

Public policymakers have long recognized the need to facilitate access to dental services for children, particularly children from low-income households.⁸² Children who have a dental home are more likely to receive early preventive and appropriate oral health care.⁸³⁻⁸⁵ Several state dental public health programs assist families in establishing dental homes for high-risk children or those with unmet dental needs.

The concept of a dental home is evolving. For example, [Iowa's definition of a dental home](#) is a network of individualized care based on risk assessment, which includes oral health education, dental screenings, preventive services, diagnostic services, restorative treatment services, and emergency services. This “virtual dental home” is one solution to the insufficient number of dentists in the U.S. to provide a dental home for all children.

Additionally, medical and dental homes have led to the concept of a “health home” to coordinate all health care needs. At the 2009 Institute of Medicine workshop [Sufficiency of the U.S. Oral Health Workforce in the Coming Decade](#), presenters discussed moving toward better integration of dental care within the medical home model by creating a health home. An example of this integration is a trained pediatrician or qualified medical personnel conducting an oral risk assessment on a child, providing basic oral health education to the parent, delivering appropriate prevention services, and making necessary dental referrals. The establishment of such a health home will further integrate oral health into the overall health care system.

Dental Workforce and Professional Development

To assure the oral health of all U.S. children, a sufficient dental workforce is needed with professionals in diverse settings. Several factors determine an adequate dental workforce: numbers, distribution, composition (provider types), competencies, and coordination among various provider types and with the medical systems. CDHP developed the following principles to advocate for an adequate and effective workforce to achieve optimal oral health for all children:⁸⁶

- **Integrate established science on prevention and disease management into educational and training programs.** A variety of health professionals should be appropriately trained on all aspects of dental disease including prevention of ECC; disease management that includes family-centered and risk-based interventions; and parent education to minimize disease transmission and establish lifelong healthy behaviors.
- **Create an equitable dental workforce to meet the needs of all families.** Strategies are needed to assure an adequate supply of dental professionals, equitable distribution of dental professionals, and improved capacity and efficiency of the dental workforce.
- **Expand the diversity of the dental workforce to meet current and future demands.** The Institute of Medicine has recommended increasing the number of minority health professionals as a key strategy to eliminating health disparities; evidence indicates that racial and ethnic diversity among health professionals is associated with improved access to care for minority patients.⁸⁷ Nearly 25 percent of the U.S. population is African American, Hispanic American, and American

Indian.⁸⁸ Only five percent of dentists are from these racial/ethnic groups.⁸⁸ More than 91 percent of dental hygienists are non-Hispanic White.⁸⁹

Traditionally, dental care teams deliver services through the combined expertise, knowledge and/or skills of dentists, dental hygienists and dental assistants. To address access to care problems, workforce development should focus on enhancing the dental team. Issues requiring more effective and efficient dental teams to meet workforce demands include the following:

- General dentists, lacking experience and/or confidence in treating young children, tend to rely on pediatric dentists to provide care to children of preschool-age. A survey of general dentists showed that nearly one of five responding dentists “often or always” referred children age three through five years.⁹⁰
- There is a shortage of pediatric dental specialists. In 2008, there were 233,104 dentists in the U.S. of which 6,087 (2.6%) were pediatric dentists.²⁷
- Efforts are needed to increase the willingness of general dentists to treat preschool children and expand their knowledge and skills to manage young patients. Dentists who graduated from a dental education program with increased exposure to patient behavior management and complex pediatric dental procedures are more likely to provide comprehensive treatment to younger children.⁹¹
- Low-income inner city and rural/frontier communities have the greatest dental disease burden and experience greater dental workforce shortages. According to the [Health Services Resource Administration](#), as of September 2009 there are 4,230 Dental Health Personnel Shortage Areas in the United States, encompassing 49 million persons.⁹² Many of these underserved areas use community health workers to provide education and link families to care.
- More than 150,000 dental hygienists are licensed to practice in the U.S.⁸⁹ Practice laws in 30 states have increased [direct access for dental hygienists](#) to initiate treatment based on her/his assessment of patient’s needs with indirect supervision of a dentist.⁹³
- Potential new members of the dental team have been recommended as a way to increase the workforce capacity. Current efforts to develop new dental team members in the U.S. include:²⁸⁻³¹ (a) the Alaska Native Tribal Health Consortium’s and University of Washington School of Medicine’s [Dental Health Aide Therapists](#); (b) The University of Minnesota School of Dentistry’s [Bachelor of Science and Master programs in dental therapy](#); (c) the American Dental Association’s [Community Dental Health Coordinators](#) (CDHC); and (d) the American Dental Hygienists Association’s [Advanced Dental Hygiene Practitioners](#) (ADHP). W.K. Kellogg Foundation’s 2009 report [Training New Dental Health Providers in the U.S.](#) provides an assessment of these new dental team possibilities.⁹⁴

4. Systems of Integration and Coordination

Integrating and coordinating oral health into health, developmental and education systems that support young children is essential to prevent and control tooth decay in early childhood. Interaction with early intervention programs, early childhood education and child care programs, schools, members of the medical and dental communities, and other public and private community agencies is needed to ensure awareness of age-specific oral health issues.⁸⁰ The

Systems of Integration and Coordination

- Partnership with health and childcare providers
- State and local dental public health programs
- Policy development

collective efforts of provider groups, state/community program administrators, advocates for children/families, and policymakers will be needed to implement effective strategies, programs and services at the state and local levels.

Partnership with Health and Childcare Providers

Physicians, nurses, and allied health professionals are far more likely to see new mothers and infants than are dentists. These non-dental health professionals must be engaged as partners to advocate and support early childhood oral health. Childcare providers, who are invested in children's well-being, are also needed as partners. It is important that they be knowledgeable of the origin and associated risk factors for tooth decay, empowered to make appropriate decisions regarding timely and effective interventions, and able to facilitate dental care for young children.^{84,95}

Partnership with health and childcare providers to prevent and control tooth decay in early childhood assures that:

- curricula of medical, nursing, and allied health professional programs seriously consider the inclusion of training on the transmissible nature of tooth decay, methods of risk assessment, anticipatory guidance, and early intervention;⁶⁴
- primary health care professionals who serve mothers and young children provide parents/caregivers education on the cause and prevention of tooth decay;
- pregnant women receive oral health counseling and referral for a comprehensive oral examination, which includes both prevention and treatment modalities;
- infants receive an oral health risk assessment from their primary health care provider or qualified health care professional by 6 months of age;⁶⁴ and
- all children have a dental home.

State and Local Dental Public Health Programs

Organized efforts to promote early childhood oral health through state and local dental public health programs can: (a) raise public awareness on the burden and consequences of tooth decay in early childhood, (b) highlight the oral health status of young children, and their dental service needs for disease prevention and control, (c) mobilize partners to integrate systems, avoid duplicating services, and leverage resources, (d) provide a statewide and/or local assessment of the burden of disease, and (e) support state and local strategic plans developed and implemented by stakeholders and constituents.

State dental public health programs (administered by the state health agencies or by statewide initiatives) should have a focus on population-based and infrastructure-building strategies. These strategies are necessary to ensure that the specific oral health needs of young children are met. For statewide support and coordination among partners, stakeholders and constituents, collaboratively developing a strategic plan based on state findings and needs will establish specific goals, objectives, and activities with expected outcomes to improve the oral health status and access to care for young children. Such a strategic plan can guide state early childhood dental disease prevention programs to implement activities that may include:

- Develop a state early childhood oral health task force if one does not already exist;
- Use Medicaid data to assess early childhood oral health access and utilization;

- Conduct a statewide oral health survey of preschool children (e.g., Head Start);
- Educate partners, stakeholders, funders, legislature and the public on tooth decay in early childhood, its consequences, and prevention;
- Develop policies that address coordination of care, quality assurance and standards of care;
- Promote public-private partnerships, and system integration and coordination;
- Integrate recommendations for preventing tooth decay in early childhood into existing state improvement plans and infrastructure;
- Develop guidelines and practice models on early prevention and management of tooth decay for use by other maternal and child health partners; and
- Evaluate the effectiveness of state and local early childhood dental disease prevention programs.

Local dental public health programs (such as preschool-based and community-based early childhood oral health programs implemented by county/city health departments, community organizations, faith-based organizations, and hospital systems) can provide all of the state dental public health program activities within their local settings as well as provide a range of frontline services to children, families and communities. Frontline services may be offered in a variety of settings including WIC centers, Head Start centers, preschool centers, neighborhood service centers, community-based clinics, and school-based clinics that extend services to young siblings. Local programs providing clinical care may use permanent (fixed) facilities, portable dental equipment and mobile dental vans, or contract with dental service providers. Oral health services for counseling, prevention and treatment can be added to existing community-based health care programs and centers.⁹⁶ Local programs may include these additional oral health activities:

- Educate or counsel children, parents and other caregivers;
- Train daycare, perinatal and child health providers;
- Provide case management/care coordination, establish dental homes, or develop health homes;
- Provide enabling services that include transportation, translation, and assistance with enrollment in Medicaid or the Children's Health Insurance Program (CHIP);
- Deliver dental preventive services, such as caries risk assessment, anticipatory guidance, fluoride varnish applications, and saliva testing for levels of bacteria;
- Deliver dental restorative services;
- Support dental team enhancements and utilize technology (e.g., teledentistry) to reduce barriers and increase access to care for underserved children especially in dental health professional shortage areas; and
- Evaluate the quality and effectiveness of services provided.

Outcomes for state or local dental public health programs to prevent and control early childhood tooth decay should be tracked and routinely assessed for improvement in knowledge, attitudes, behaviors, practices, systems, and oral health status. Long-term program outcomes should realize improved state and local early childhood dental disease prevention programs and care systems, improved capacity in the delivery of oral health care services for young children through new workforce models, and improved oral health status of young children.

Policy Development

Oral health policy is needed to provide clear decisions and statements that will guide oral health practices and actions. Oral health policy is comprised of the decisions that determine how issues are addressed either by those elected or appointed to represent communal interests (“public policy”) or those involved in the delivery of health services (“clinical policy”).⁹⁷

- **Public policy** deals with issues related to allocation of shared resources (people, programs and dollars) and the conditions under which those resources are distributed and utilized. For example, public policies govern what benefits are covered under various health programs; what types of health promotion, disease prevention and treatment programs are available to a population; and what actions should be taken to address access to care where service shortages exist. State and local public health interventions are most commonly supported by resources that are determined through the public policy process.
- **Clinical policy** deals with issues of care delivery. Typical issues include what and when clinical services are to be provided under a benefit program and how those services are delivered. Because policy decisions impact resources as competing interests often vie for scarce resources within budgetary constraints.

A wide range of policy-related issues impact early childhood oral health, including:⁹⁷

- surveillance;
- disease management;
- dental care services and safety net services;
- dental care organization and financing;
- workforce;
- case management and beneficiary services; and
- family-centered care.

Opportunities exist to promote policies to improve early childhood oral health on federal, state, and local levels. Initiatives could advocate increasing access to community water fluoridation, establishing state surveillance for early childhood oral health, and expanding community-based early childhood preventive programs. The 2009 Children’s Health Insurance Program Reauthorization Act (CHIPRA) illustrates the potential impact of a policy. The new federal law reauthorizing CHIP seeks to improve access to dental care and expands efforts to prevent dental disease through [major provisions](#) with [oral health benefits](#) that include dental coverage guarantee for CHIP beneficiaries, dental coverage that “wraps” around commercial medical coverage, and a required program to educate new parents on ECC. The CHIPRA requirement to provide new parent ECC education can open a significant opportunity for public health to partner with Medicaid and third-party payers of perinatal services.

The National Oral Health Policy Center at CDHP has reported policy options for managing childhood tooth decay ([October 2009 edition of TrendNotes](#)). This issue of *TrendNotes* focuses policymakers’ attention on the trends, opportunities and options to improve oral health for all children through the best use of prevention, disease management, care coordination, and resources. Additional early childhood oral health policies developed by federal agencies and national organizations are listed below in “Section II – Guidelines & Recommendations from Authoritative Sources.”

Legislators, policymakers, and third party payors should be educated about the benefits of early intervention to support efforts to improve oral health and access to care for young children.⁶⁴

F. Initiatives and Coordinated Efforts

➤ *What are some recent national efforts to prevent tooth decay in young children?*

Examples of national initiatives and coordinated efforts include:

- [Targeted Oral Health Services Systems \(TOHSS\) Grant Program](#)
The Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB) TOHSS grant program supports states in expanding preventive and restorative oral health service programs for Medicaid and CHIP eligible children, and other underserved children and their families. Grantees are asked to develop state strategies to make improvement within three program areas, which include increasing the number of children receiving age one dental visits and serving young children with special health care needs (CSHCN).
- [Oral Health Disparities Collaborative \(OHDC\) Pilot](#)
HRSA's Bureau of Primary Health Care initiated the OHDC pilot to develop comprehensive primary oral health care system change interventions (based on the Chronic Care Model and evidence-based concepts) to improve ECC prevention and treatment, and perinatal oral health in Health Centers. The pilot developed the *Oral Health Disparities Collaborative Implementation Manual* to guide future efforts.
- [The American Academy of Pediatrics \(AAP\) Oral Health Initiative](#)
Activities of the AAP Oral Health Initiative include: an oral health preceptorship program (provides pediatricians mentorship support to implement oral health assessment, conduct oral assessment interview, and apply fluoride varnish), Oral Health Grant Projects (support local oral health initiatives), and a pediatric oral health training program for pediatricians.
- [Maternal and Child Health Bureau / Administration for Children and Families \(ACF\) Office of Head Start Collaborations](#)
Between 2001 and 2007 HRSA MCHB and the ACF Office of Head Start engaged in collaborative and coordinated activities that focused on states and communities. During that time ASTDD provided support to all 50 states, D.C. and 4 U.S. territories to hold Head Start oral health forums and develop action plans. Subsequently 35 states, D.C. and 3 territories received support to implement recommendations from their action plans.
- [The American Academy of Pediatric Dentistry Head Start Dental Home Project](#)
AAPD and the Office of Head Start (HS) are partnering at the national, regional, state, and local level to link HS children with dental homes. A national network of pediatric dentists and general dentists will be created to provide quality dental homes, train dentists and HS personnel in oral health care practices, and assist HS programs to obtain comprehensive services to meet HS children's oral health needs.
- [A Symposium on Biobehavioral Interventions to Improve Pediatric Health](#)
The Children's Dental Health Project, in conjunction with the Global Child Dental Health Task Force, Columbia University, and the New York Academy of Sciences, convened a symposium in 2009 aimed at promoting the development, testing, and implementation of biobehavioral interventions to improve pediatric health.

II. Guidelines & Recommendations from Authoritative Sources

A. Office of Surgeon General

Oral Health in America: A Report of the Surgeon General

The Surgeon General's Report on Oral Health in America reported the following:

- Effective disease prevention measures exist for use by individuals, practitioners and communities (most focus on dental caries prevention such as fluorides).
- Many community-based programs required a combined effort among social service, health care, and education services at the state or local level.
- Primary prevention of dental disease is possible with appropriate diet, nutrition, oral hygiene, and health-promoting behaviors, including the use of professional services.

National Call to Action to Promote Oral Health

The National Call to Action to Promote Oral Health calls for the following actions to achieve the goals of the Surgeon General and Healthy People oral health objectives, which include oral health of young children:

- Change perceptions of oral health.
- Overcome barriers by replicating effective programs and proven efforts.
- Build the science base and accelerate science transfer.
- Increase oral health workforce diversity, capacity, and flexibility.
- Increase collaborations.

Surgeon General's Conference on Children and Oral Health

Recommendations from the 2000 Conference on Children and Oral Health to eliminate disparities in children's oral health and their access to care include:

- Start early, emphasize prevention, and involve parents.
- Assure a sufficient workforce and public health capacity.
- Revamp health professional education.
- Integrate and innovate in science and all service delivery systems.
- Expand the knowledge base and transfer science.
- Develop strategic communication plans.
- Align policy with knowledge and children's needs.

B. Healthy People 2020 – Oral Health

Healthy People 2020 objectives promoting early childhood oral health include:

- OH-1.1 Reduce the proportion of young children aged 3 to 5 years with dental caries experience in their primary teeth.
- OH-2.1 Reduce the proportion of young children aged 3 to 5 years with untreated tooth decay in their primary teeth.
- OH-7 Increase the proportion of children, adolescents, and adults who used the oral health care system in the past year .
- OH-8 Increase the proportion of low-income children and adolescents who received any preventive dental service during the past year.
- OH-12.1 Increase the proportion of children aged 3 to 5 years who have received dental sealants on one or more of their primary molar teeth.
- OH-13 Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water.

- OH-15 Increase the number of States and the District of Columbia that have a system for recording and referring infants and children with cleft lips and cleft palates to craniofacial anomaly rehabilitative teams.

C. Association of State & Territorial Dental Directors (ASTDD)

ASTDD promotes a governmental oral health presence in each state and territory, to formulate and promote sound oral health policy, to increase awareness of oral health issues, and to assist in the development of initiatives for prevention and control of oral diseases.

- [Community Water Fluoridation Policy Statement](#)
- [Fluoride Varnish Policy Statement](#)
- [Fluoride Varnish Research Brief](#)

D. American Association of Public Health Dentistry (AAPHD)

AAPHD policies related to promoting oral health of young children include:

- [Policy Statement on Primary Care](#)
- [First Oral Health Assessment Policy](#)
- [Policy on Access to Care](#)
- [Resolution on Fluoride Varnish for Caries Prevention](#)

E. American Public Health Association (APHA)

APHA policy statements in support of early childhood oral health include:

- [Community Water Fluoridation in the United States](#)
- [First Oral Health Assessment](#)

F. American Academy of Pediatric Dentistry (AAPD)

AAPD policy statements and guidelines include:

- [Oral Health Care Programs for Infants, Children, and Adolescents](#)
- [Dental Home](#)
- [Use of a Caries-risk Assessment Tool \(CAT\) for Infants, Children, and Adolescents](#)
- [Use of Fluoride](#)
- [Early Childhood Caries: Classifications, Consequences, and Preventive Strategies](#)
- [Infant Oral Health Care](#)

G. American Academy of Pediatrics (AAP)

The AAP policy statement on [Oral Health Risk Assessment Timing and Establishment of the Dental Home](#) recommends:

- Health care professionals who serve mothers and infants should integrate parent and caregiver education into their practices that instruct methods to prevent ECC.
- Pediatricians and pediatric health care professionals should be trained to perform oral health risk assessments on all children starting at 6 months of age.
- Pediatricians should support the concept of identifying a dental home as ideal for all children in the early toddler years.

H. American Dental Association (ADA)

ADA positions and statements include:

- [ADA Statement on Early Childhood Caries](#)
- [ADA Supports Fluoridation](#)
- [ADA Statement on Water Fluoridation Efficacy and Safety](#)
- [ADA Statement on the Effectiveness of Community Water Fluoridation](#)

I. American Academy of Family Physicians (AAFP)

AAFP has published anticipatory guidance for perinatal and infant oral health:

- [A Practical Guide to Infant Oral Health](#)
- [Anticipatory Guidance in Infant Oral Health: Rationale and Recommendations](#)
- [Oral Health During Pregnancy](#)

J. [American Academy of Periodontology \(AAP\)](#)

The [AAP Statement Regarding Periodontal Management of the Pregnant Patient](#) encourages all women to attain good oral health prior to and throughout their pregnancies, and encourages necessary treatment beginning early in and throughout the pregnancy.

K. [Administration for Children and Families, Office of Head Start \(OHS\)](#)

OHS policies govern compliance of oral health requirements. The [Head Start Program Instruction for Oral Health](#) outlines requirements for oral health hygiene, establishment of a dental home, dental screenings, and Medicaid EPSDT Periodicity Schedule.

L. [Children’s Dental Health Project \(CDHP\) – Policy Focus Areas](#)

CDHP works with advocates and policymakers to provide research-based evidence, policy options, and technical assistance needed to ensure that the oral health of children is a priority. Policy focus areas include prevention, financing, public health, equity and awareness.

M. [HRSA, Maternal and Child Health Bureau and AAP – Bright Futures](#)

HRSA, Maternal and Child Health Bureau and AAP developed Bright Futures, a resource containing principles, strategies, and tools that are theory-based, evidence-driven, and systems-oriented to improve the health and well-being of all children. [Bright Futures Guidelines](#) provide anticipatory guidance for oral health from infancy through 21 years of age ([Early Childhood Visits](#), [Middle Childhood Visits](#) and [Adolescent Visits](#)).

N. [U.S. Preventive Services Task Force – Prevention of Dental Caries in Preschool Children: Summary of Recommendations](#)

The U.S. Preventive Services Task Force reports on the results of an examination of evidence related to young children’s dental disease and gives recommendations on the primary care physicians’ role to prevent dental disease in children of preschool-age.

O. [U.S. Department of Health & Human Services, Centers for Medicare & Medicaid Services – Guide to Children’s Dental Care in Medicaid](#)

The Guide to Children’s Dental Care in Medicaid promotes early initiation of oral health care including infant oral health care, first dental visit, dental primary care, and a dental home.

P. [New York State Department of Health – Oral Health During Pregnancy and Early Childhood Practice Guidelines](#)

In 2006, the New York State Department of Health convened an expert panel of health care professionals to develop recommendations (published as the Guidelines) to bring about changes in the health care delivery system and to improve the overall standard of care.

Q. [California Dental Association Foundation – Oral Health During Pregnancy and Early Childhood: Evidence-Based Guidelines for Health Professionals](#)

In 2009, California Dental Association Foundation convened an expert panel of medical and dental professionals to provide practice guidelines, based on evidence and professional consensus, on the importance of dental care to pregnant women and their young children.

R. [Scottish Intercollegiate Guidelines Network – Prevention and Management of Dental Decay in the Pre-School Child: A National Clinical Guideline](#)

The guideline addresses effective strategies for preventing and managing dental decay in the preschool child. Methods for prevention and management of the disease at an individual and population level are reviewed; identification of children at increased risk is discussed.

III. Research Evidence

The following major sources of evidence-based reviews contribute to the body of evidence on ECC prevention and management:

1. The Agency for Healthcare Research and Quality (AHRQ) assessed methods for the diagnosis and treatment of dental caries in 2001 and provided the results in the report [Diagnosis and Management of Dental Caries](#). AHRQ found that evidence was poor in support of any diagnostic method for cavitated carious lesions, and that evidence was incomplete in support of methods for the management of noncavitated carious lesions. Of nine identified management methods for individuals with active dental caries, evidence for all techniques was rated as incomplete, except for fluoride varnish which was rated as fair. AHRQ determined that further research is needed to assess the performance of existing diagnostic methods and management strategies for active caries.⁹⁸
2. The National Institutes of Health convened the [Consensus Development Conference on Diagnosis and Management of Dental Caries Throughout Life](#) in 2001. The Consensus Development Conference Statement provided guidance on the best methods for detecting caries in early and advanced stages, indicators for elevated risk, best methods for primary prevention of caries, the best treatments for arresting or reversing early caries progression, and identified new directions for future research.⁹⁹
3. U.S. Preventive Services Task Force (USPSTF) is an independent panel of experts in primary care and prevention, convened by the U.S. Public Health Service, to systematically review the evidence of effectiveness and develop recommendations for clinical preventive services. Recommendations on [Prevention of Dental Caries in Preschool Children](#) were provided in 2004. The USPSTF found fair evidence and recommends that primary care clinicians prescribe oral fluoride supplementation at currently recommended doses to preschool children older than 6 months of age whose primary water source is deficient in fluoride. It concludes that the evidence is insufficient to recommend for or against routine risk assessment of preschool children by primary care clinicians for the prevention of dental disease.¹⁰⁰

The USPSTF also found that “there are several gaps in evidence on the prevention of dental disease in young children.” The Task Force found no relevant studies assessing primary care providers’ efficacy in promoting parental compliance for fluoride supplementation, and no studies to determine primary care providers’ accuracy when identifying children at higher risk levels for dental caries or in their effectiveness for providing referrals to dentists. The USPSTF also describes little evidence for health education efforts to improve oral hygiene and prevent acquisition of caries and limited evidence for the efficacy of parental education efforts by primary care providers in the prevention of dental disease.¹⁰⁰

4. The Cochrane Reviews explore the evidence for and against the effectiveness and appropriateness of treatments to facilitate the choices that doctors, patients, policymakers

and others face in health care (published in [The Cochrane Library](#)).¹⁰¹ A selection of [Cochrane Oral Health Group Reviews](#) relevant to ECC are highlighted below:

- [Fluoride varnishes for preventing dental caries in children and adolescents](#) (7/22/2002)
There is a substantial caries-inhibiting effect of fluoride varnish in both the permanent and the primary teeth based largely on trials with no treatment controls.
- [Fluoride toothpastes for preventing dental caries in children and adolescents](#) (1/20/2003)
There is clear evidence that fluoride toothpastes are efficacious in preventing caries.
- [Topical fluoride \(toothpastes, mouthrinses, gels or varnishes\) for preventing dental caries in children and adolescents](#) (10/20/2003)
The benefits of topical fluorides have been firmly established on a sizeable body of evidence from randomized controlled trials.
- [One topical fluoride \(toothpastes, or mouthrinses, or gels, or varnishes\) versus another for preventing dental caries in children and adolescents](#) (1/26/2004)
The comparative effectiveness of fluoride varnishes and gels is inconclusive.
- [Complete or ultraconservative removal of decayed tissue in unfilled teeth](#) (7/19/2006)
Partial caries removal is preferable to complete removal in a deep lesion to reduce the risk of pulpal exposure.
- [Dental fillings for the treatment of caries in the primary dentition](#) (4/15/2009)
Only three trials compared three different types of materials were suitable for inclusion in the review. No significant differences found in all three trials for the outcomes assessed.

Since the 2002 Cochrane review of fluoride varnishes, a 2006 randomized clinical trial found that fluoride varnish applied twice a year prevented 58 percent of cavities in children 6 to 44 months of age.⁵⁵

5. The [ADA Center for Evidence-Based Dentistry](#) provides systematically assessed evidence as tools and resources to support clinical decisions to integrate evidence into patient care:
 - An expert panel established by the ADA Council on Scientific Affairs evaluated the collective body of scientific evidence and provided [evidence-based clinical recommendations on the use of professionally applied topical fluoride](#) (published in May 2006).⁵⁸ For children younger than six years of age, fluoride varnish is recommended for moderate and high risk children.
 - An expert panel convened by the ADA Council on Scientific Affairs evaluated the collective evidence and developed [evidence-based clinical recommendations on the use of pit-and-fissure sealants](#) (published in March 2008).¹⁰² The panel concluded that sealants are effective in caries prevention and that sealants can prevent the progression of early non-cavitated carious lesions. Sealants should be placed on pits and fissures of children's primary teeth when it is determined that the tooth, or the patient, is at risk of experiencing caries (evidence from non-experimental descriptive studies, such as comparative correlation, cohort and case-control studies).

Currently there is little evidence on the cost-effectiveness of interventions to prevent ECC delivered in clinical or community settings. Current research is being conducted on interventions that target the inter-relationships of psychosocial, behavioral and biological processes to prevent and manage tooth decay, and further research and demonstration studies are needed to provide additional evidence of the efficacy/efficiency of prevention and management methods for dental caries in infants and young children, and effectiveness and cost-effectiveness of community program models.

When research evidence is insufficient to determine the effectiveness and efficiency of interventions, developing practices will need to consider the theoretical rationale, expert opinions and current practices. Insufficient evidence does not mean that an intervention is "not effective" but that inadequate studies are available to make an assessment.

IV. Best Practice Criteria

The ASTDD Best Practices Project has selected five best practice criteria to guide state and community oral health programs in developing their best practices. For these criteria, initial review standards, are provided to help evaluate the strengths of a program or practice to prevent and control tooth decay in young children.

1. Impact / Effectiveness

- A practice or program enhances the processes to improve oral health status and/or improve access to dental care for infants and toddlers.
Example: Increased number of programs to train physicians, nurses, and dentists to provide screening and preventive services for infants and toddlers or increased number of providers being trained.
- A practice or program produces outcomes that improve oral health status and/or improve access to dental care for infants and toddlers.
Example: Reduced dental caries experience and untreated decay among children, fewer emergency visits to the dentist, or fewer hospital operating room services for dental problems.

2. Efficiency

- A practice or program shows cost savings in preventing oral disease and reducing the extent of treatment needs for infants and toddlers.
Example: Increased savings based on the comparison of the cost for delivering prevention services to the projected cost of restorative treatment for averted tooth decay and having treatment in the operating room.
- A practice or program shows leveraging of federal, state, and/or community resources to improve the oral health of infants and toddlers.
Example: Expanded the partnership between the public and private sectors to support an oral health program for outreach, case management, preventive services, and dental restorative care for high-risk children.

3. Demonstrated Sustainability

- A practice or program that has demonstrated sustainability or has a plan to maintain sustainability.
Example: A program that has served infants and toddlers for many years and receives agency line-item funding and reimbursement from public and private insurers.

4. Collaboration / Integration

- A practice or program establishes partnerships or collaborations that integrate oral health efforts with other disciplines to improve the general health of infants/toddlers.
Example: The state oral health and MCH programs working collaboratively to improve systems of care (such as improving coordination between medical and dental homes) and financing for oral health.

5. Objectives / Rationale

- A practice or program aligns its objectives with the national or state agenda to improve the oral health and general health of infants and toddlers.

Example: Program objectives target Healthy People 2020 objectives to reduce caries experience, untreated decay, and use of the oral health care delivery system.

V. State Practice Examples

The following practice examples illustrate various elements or dimensions of the best practice approach of *Prevention and Control of Early Childhood Tooth Decay*. These reported success stories should be viewed in the context of the states and program's environment, infrastructure and resources. End-users are encouraged to review the practice descriptions (click on the links of the practice names) and adapt ideas for a better fit to their states and programs.

A. Summary Listing of Practice Examples

Table 1 provides a listing of programs and activities submitted by states. Each practice name is linked to a detailed description.

Table 1. State Practice Examples Illustrating Strategies and Interventions for the Prevention and Control of Early Childhood Tooth Decay			
#	Practice Name	State	Practice
Oral Health Training for Health Professionals			
1	American Academy of Pediatrics' Oral Health Initiative	All States	99002
2	Washington State's Access to Baby and Child Dentistry (ABCD) Program	WA	54001
3	Baby Oral Health Program (bOHP)	NC	36005
4	OPEN WIDE	CT	08002
Primary Prevention			
5	The Mother and Youth Access (MAYA) Project	CA	06004
6	Oral Health Disparities Collaborative	CO & MT	99001
7	BEST (Bringing Early Education, Screening and Treatment) Oral Health Program	MA	24008
8	Healthy Smiles Fluoride Varnish Program	ND	37002
Care Coordination and Systems Integration			
9	I-Smile™ Dental Home Project	IA	18008
10	First Smiles – A First 5 Oral Health and Training Program	CA	06003
11	Klamath Country Early Childhood Cavities Prevention Program	OR	40006
12	West Virginia University Childhood Oral Health Project	WV	55001
13	The Neighborhood Outreach Action for Health (NOAH) Program: Integrated Medical and Dental Health in Primary Care	AZ	04007

14	Tooth Tutor Dental Access Program	VT	51001
15	Oral Health Across the Commonwealth (OHAC) Portable Dental Program	MA	24007

B. Highlights of Practice Examples

Highlights of state practice examples are listed below.

Oral Health Training for Health Professionals

All States [American Academy of Pediatrics' Oral Health Initiative](#) / Practice #99002
The AAP Oral Health Initiative (OHI) implements activities with a focus on public and professional education, collaboration at the national/state/local levels to affect systems change, and improved communication within AAP on oral health disparities.

WA [Washington State's Access to Baby and Child Dentistry \(ABCD\) Program](#) / Practice #54001
The ABCD Program provides preventive and restorative dental care for Medicaid-eligible children from birth to age six. The program is based upon the premise that starting dental visits early will yield positive behaviors from parents and children.

NC [Baby Oral Health Program \(bOHP\)](#) / Practice #36005
The bOHP, developed at the University of North Carolina at Chapel Hill, trains dental students and practitioners to provide dental preventive services to infants and toddlers. A bOHP kit includes tools to assist the dental team and educate parents/caregivers.

CT [OPEN WIDE](#) / Practice #08002
OPEN WIDE is a training program designed to educate health and human services providers about oral health in early childhood development, and enable providers to engage in anticipatory guidance and deliver prevention interventions.

Primary Prevention

CA [The Mother and Youth Access \(MAYA\) Project](#) / Practice #06004
The MAYA Project, a randomized clinical trial, was designed to compare different interventions to prevent dental caries: chlorhexidine rinses to reduce the number of tooth decay causing bacteria, fluoride varnish applications to increase enamel remineralization, and parental oral health counseling to promote behavioral change.

CO & MT [Oral Health Disparities Collaborative](#) / Practice #99001
The Oral Health Disparities Collaborative was launched in order to improve access to oral health services for low-income children ages 0 to 5 and pregnant women. The Collaborative used the Chronic Care Model as the framework for system redesign.

MA [BEST \(Bringing Early Education, Screening and Treatment\) Oral Health Program](#) / Practice #24008
The BEST Oral Health Program uses a community approach in oral health prevention and early intervention for infants, toddlers, and families with high risks. The program "piggy-backs" oral health services to services and infrastructure of existing programs.

ND [Healthy Smiles Fluoride Varnish Program](#) / Practice #37002
The Healthy Smiles program trains licensed practical nurses, registered nurses, physicians, physician assistants, dental hygienists, and dental assistants in dental screening and application of fluoride varnish.

Care Coordination and Systems Integration

- IA [I-Smile™ Dental Home Project](#) / Practice #18008
The I-Smile™ Dental Home Project is an initiative to ensure at-risk children have early and regular dental care. The project was created in response to state legislation requiring Medicaid-enrolled children age 12 and younger to have a dental home.
- CA [First Smiles – A First 5 Oral Health and Training Program](#) / Practice #06003
The First Smiles was a four-year, statewide oral health training and education program. The program trained dental providers and medical providers, as well as early childhood caregivers, on the prevention of dental caries in children age 0-5 years.
- OR [Klamath Country Early Childhood Cavities Prevention Program](#) / Practice #40006
Oregon's Klamath County Department of Public Health administers an Early Childhood Cavity Prevention Program for low-income children up to three years of age, integrating preventive care into Women, Infants and Children (WIC) clinical services.
- WV [West Virginia University Childhood Oral Health Project](#) / Practice #55001
The goal of the Childhood Oral Health Project is to increase the responsiveness of the West Virginia University (WVU) Health Sciences Center to address issues related to childhood oral health. Strategies included modifying the curriculum of the WVU Schools of Dentistry, Medicine, Nursing and Pharmacy to include oral health content.
- AZ [The Neighborhood Outreach Action for Health \(NOAH\) Program: Integrated Medical and Dental Health in Primary Care](#) / Practice #04007
The NOAH Program provides an integrated model for offering medical and dental care services for uninsured and underinsured children and their immediate family members. NOAH operates a school-based center and a community-based center.
- VT [Tooth Tutor Dental Access Program](#) / Practice # 51001
The goal of the Tooth Tutor Dental Access Program is to link children to dental homes. The program serves children in grades K-6 and Head Start children. Half of all elementary schools and all Head Start programs in Vermont participate in the program.
- MA [Oral Health Across the Commonwealth \(OHAC\) Portable Dental Program](#) / Practice # 24007
The program serves children with special needs and with high risk for dental disease (Head Start, preschool and low-income children). In collaboration with Tufts University School of Dental Medicine Community Dental Program and the Commonwealth Mobile Oral Health Services, the program delivers oral health care statewide.

VI. Acknowledgements

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VII. Attachments

ATTACHMENT A

Strength of Evidence Supporting Best Practice Approaches

The ASTDD Best Practices Committee takes a broad view of evidence to support best practice approaches for building effective state and community oral health programs. The Committee evaluated evidence in four categories: research, expert opinion, field lessons and theoretical rationale. Although all best practice approaches reported have a strong theoretical rationale, the strength of evidence from research, expert opinion and field lessons fall within a spectrum. On one end of the spectrum are promising best practice approaches, which may be supported by little research, a beginning of agreement in expert opinion, and very few field lessons evaluating effectiveness. On the other end of the spectrum are proven best practice approaches, ones that are supported by strong research, extensive expert opinion from multiple authoritative sources, and solid field lessons evaluating effectiveness.

<u>Promising</u> <u>Best Practice Approaches</u>					<u>Proven</u> <u>Best Practice Approaches</u>	
Research	+		⇒		Research	+++
Expert Opinion	+		⇒		Expert Opinion	+++
Field Lessons	+				Field Lessons	+++
Theoretical Rationale	+++				Theoretical Rationale	+++

Research

- + A few studies in dental public health or other disciplines reporting effectiveness.
- ++ Descriptive review of scientific literature supporting effectiveness.
- +++ Systematic review of scientific literature supporting effectiveness.

Expert Opinion

- + An expert group or general professional opinion supporting the practice.
- ++ One authoritative source (such as a national organization or agency) supporting the practice.
- +++ Multiple authoritative sources (including national organizations, agencies or initiatives) supporting the practice.

Field Lessons

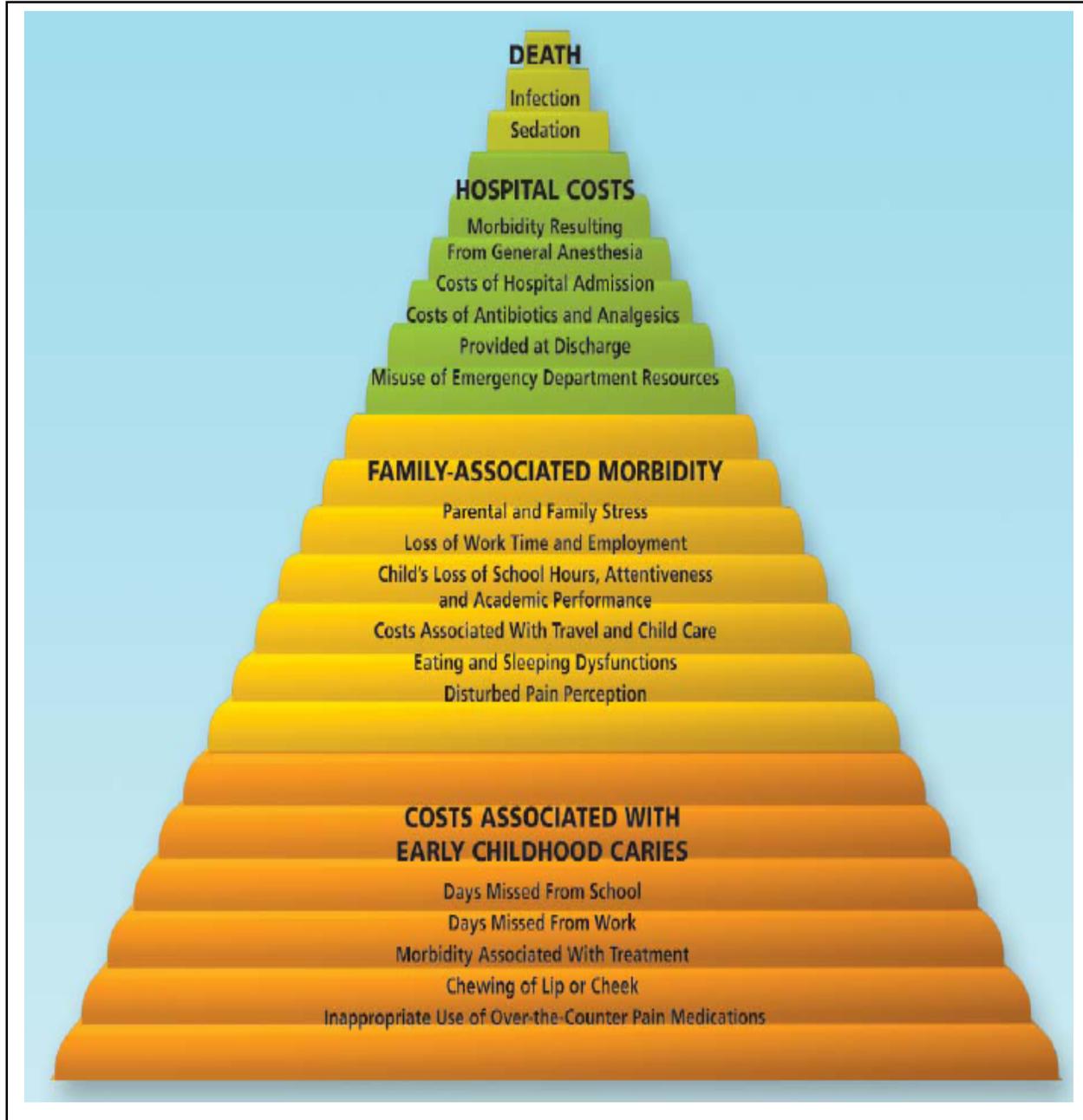
- + Successes in state practices reported without evaluation documenting effectiveness.
- ++ Evaluation by a few states separately documenting effectiveness.
- +++ Cluster evaluation of several states (group evaluation) documenting effectiveness.

Theoretical Rationale

- +++ Only practices which are linked by strong causal reasoning to the desired outcome of improving oral health and total well-being of priority populations will be reported on this website.

ATTACHMENT B

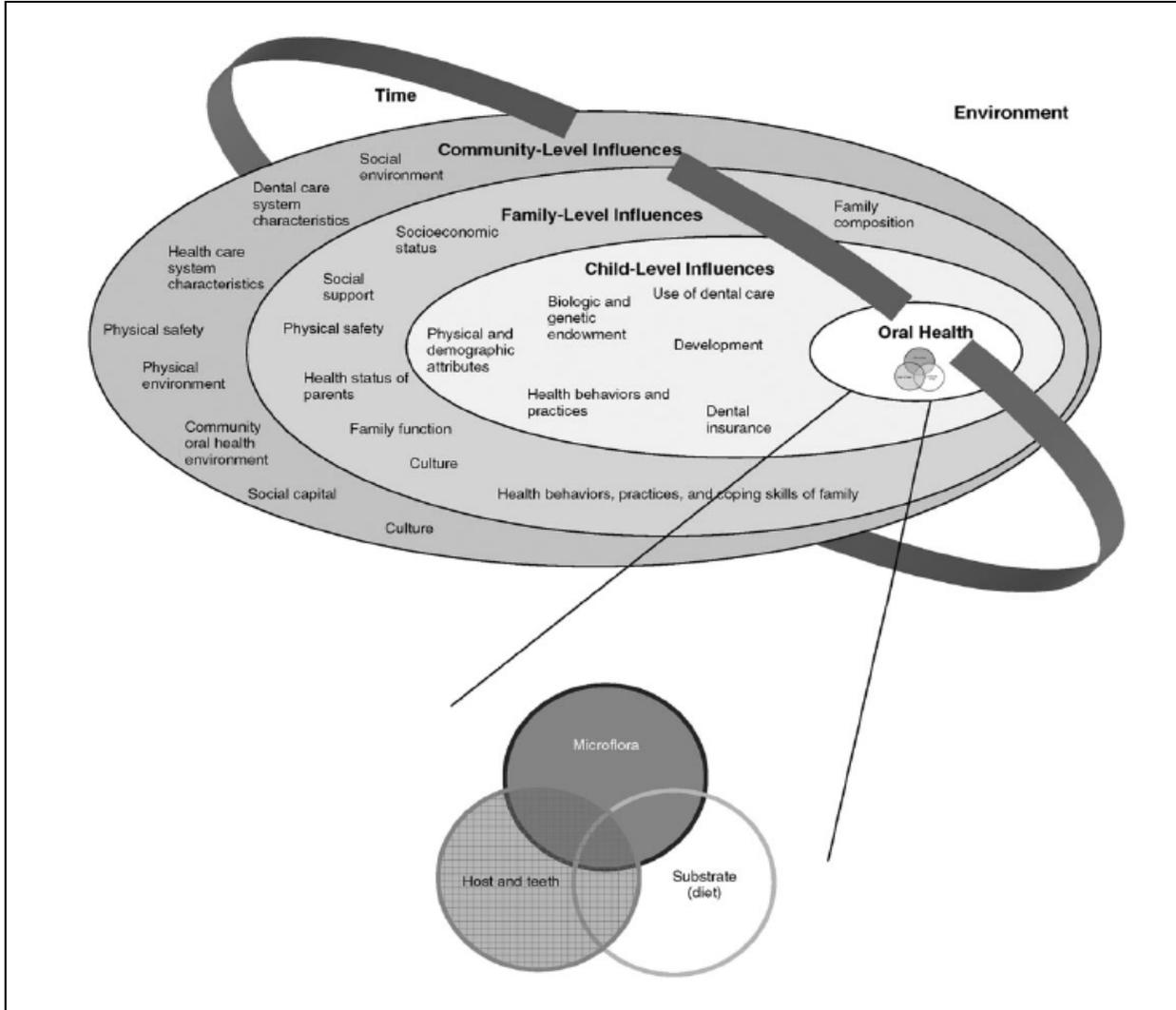
A Proposed Early Childhood Caries Morbidity and Mortality Pyramid



Source: Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E. Beyond the dmft: The human and economic cost of early childhood caries. J Am Dent Assoc 2009;140:650-657.

ATTACHMENT C

A Conceptual Model of the Influences on Children’s Oral Health



Source: Fisher-Owens SA, Gansky SA, Platt LJ, et al. Influences on children’s oral health: a conceptual model. *Pediatrics* 2007;120(3):e510-e520. Available from: <http://pediatrics.aappublications.org/cgi/content/full/120/3/e510>

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