



Clinical, Research, and Policy Implications of the Symposium on the Prevention of Oral Diseases in Children and Adolescents

Paul A. Reggiardo, DDS¹ Robert J. Feigal, DDS, MS, PhD² Paul S. Casamassimo, DDS, MS³
Steven D. Chan, DDS⁴ Man Wai Ng, DDS, MPH⁵ Michael A. Ignelzi, Jr, DDS, PhD⁶

The specialty of pediatric dentistry was proudly built with prevention as one of its cornerstones of action and service to patients. Many of the preventive strategies in use today were developed decades ago as the specialty grew in size and impact. We are proud of the many successes that we have enjoyed on behalf of our patients. The Symposium on the Prevention of Oral Diseases in Children and Adolescents has allowed us to take a contemporary look at the preventive strategies in use today and to look into the future. This manuscript, authored by the expert panelists, lists the clinical, research and policy implications that emerged from the Symposium.

The early concept of prevention was clearly a system of strategies in which "one size fits all." Our emphases on water fluoridation, fluoride applications through dentifrice and in-office applications, diet analyses and counseling, and improvements in oral hygiene were extremely effective in reducing dental disease for the majority of our patients. Despite these successes, a significant amount of disease has been refractory to our current preventive strategies. Although we have witnessed dramatic reductions in permanent tooth caries over the past few decades, the incidence of primary tooth caries is rising;¹ early childhood caries continues to be endemic in certain groups²; and despite our best efforts, there are certain individuals from all socio-economic groups who experience an inordinate amount of dental disease.

It is time for widespread inclusion of new strategies, more individualized for particular needs of families or communities, built upon contemporary understandings of cariology to attack these areas of disease intransigence. We know that caries is a disease of imbalance between de-mineralization and re-mineralization driven by bacterial biofilms.

We know that the main offenders in the microbial world are transmitted from one generation to the next through parent-child vectors. We know that some children will be essentially decay free (probably not caries free), while others will show extensive decay – the end product of the unchecked carious process. We know that frequent contact of teeth with low concentration fluoride modalities provides the best conditions to promote re-mineralization. We know that sealants, when done well, prevent carious lesions in the most susceptible surfaces. Yet, many of these preventive strategies have not made their way into widespread use in dental practice.

Many questions remain. Why do we not treat the microbial aspects of the caries process in parents so that the disease is not so prevalent in their children? Why do high-risk children not receive more frequent preventive visits, increased re-mineralization/antimicrobial treatments, and updates in counseling? Why are we not more involved in patient education at pre-natal and peri-natal medical visits (the age 0 visit!)? Why are so many of our most "at risk" families not provided a regular dental home?

The answers to these questions will not come easily. The issues are complex. Care delivery is not a simple process that changes only because of new scientific data. The implications that appear below can serve as a roadmap as we engage the many constituencies that will help us to address these challenges.

References

1. Beltrán-Aguilar ED, Barker LK, Canto MT, et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis--United States, 1988-1994 and 1999-2002. *MMRW Surveillance Summaries* August 26;54(3):1-43.
2. US Dept of Health and Human Services. *Oral Health in America: A Report of the Surgeon General – Executive Summary*. Rockville, Md: US Dept of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.

¹Dr. Reggiardo is in private practice, Huntington Beach, Calif, and is assistant clinical professor, Pediatric Dentistry, University of Southern California, Los Angeles, Calif; ²Dr. Feigal is professor and graduate program director, Pediatric Dentistry, University of Minnesota, Minneapolis, Minn; ³Dr. Casamassimo, is professor and head, Pediatric Dentistry, The Ohio State University, and chief of dentistry, Department of Dentistry, Columbus Children's Hospital, Columbus, Ohio; ⁴Dr. Chan is in private practice, Fremont, Calif; ⁵Dr. Ng is chair, Department of Dentistry, Children's Hospital, Boston, Mass; ⁶Dr. Ignelzi is associate professor, Department of Orthodontics and Pediatric Dentistry, The University of Michigan, Ann Arbor, Mich. Correspond with Dr. Reggiardo at reggiardo@prodigy.net

James Crall – Rethinking Prevention

Clinical Implications

1. Current “one size fits all” periodicity schedule and mix of preventive services may be a poor utilization of resources.
2. Targeted interventions tied to risk assessment may be a more effective way to reduce dental disease in vulnerable populations.
3. Integrated delivery systems involving non-traditional providers may be an effective way to address dental disease in pre-school and elementary school age populations.
4. The full spectrum of the dental disease process, not the end product of treating holes in teeth, may become the center of clinical practice.
5. Redesign of clinical practice using risk-based targeted interventions will have profound third-party reimbursement implications.

Research Implications

1. More effective and scientifically-based risk-assessment tools are needed to make risk assessment more evidence based.
2. Effective, clinically relevant caries disease monitoring methods must be found
3. Targeted interventions aimed at vulnerable populations need to be studied to determine cost-effectiveness and oral health outcomes.
4. The social and human impact of early childhood caries (ECC) deserves study.
5. Effectiveness of the role(s) of non-traditional providers in the prevention of ECC needs additional clarification.
6. The reasons caries rates are on the decline in all age groups except the very young needs further extensive study. Risk factors and strategies that effectively reduce these risk factors need to be better identified.
7. Etiology of caries in the primary dentition must be better understood.

Policy Implications

1. Increased pre-doctoral educational emphasis on early detection and caries disease management is needed.
2. Examination of American Academy of Pediatric Dentistry (AAPD) Policies and Guidelines regarding the proper role of non-traditional providers in caries prevention, especially ECC is warranted, as is review of AAPD Periodicity Schedules, with recommendations for change as appropriate.
3. Review of American Dental Association (ADA) and Current Dental Terminology (CDT) codes with development of new codes and coding modifications reflecting targeted interventions and altered periodicity schedules is suggested.
4. Changes in third party reimbursement policies recognizing and valuing dental disease management strategies should be sought.

5. Buy-in on the “age one dental visit” and the “dental home” from constituent groups across and outside the profession is essential.

Jessica Lee – Cost-Effectiveness of Early Dental Visits

Clinical Implications

1. Early infant dental care (i.e. the first visit at no later than one year of age) and the establishment of the dental home should become a universal element of dental practice.
2. Early establishment of the dental home will increase the likelihood of seeking future preventive services and will be associated with less subsequent restorative and emergency needs.
3. Early dental visits may result in cost-savings, especially in high caries-risk children.

Research Implications

1. Similar studies examining the cost-effectiveness and oral health outcomes of early dental care and prevention over a longer period of time are warranted.
2. Similar studies in less vulnerable populations need to be done to determine if similar benefits exist for less at-risk populations.

Policy Implications

1. Promotion of the “age-one” dental visit and universal acceptance within and outside of the profession should continue to be a “first priority” for the AAPD.
2. Establishment of the dental home early in life suggests establishing linkages with obstetric and early post-natal medical care.
3. Encourage greater exposure and clinical experience in early infant dental assessments and prevention in the dental school curriculum.
4. Policy makers and third party payers should have a greater understanding of the value of early visit education and prevention.

Ann Griffin – Microbiology of Caries and Periodontal Diseases in Children

Clinical Implications

1. Dental caries should be addressed in clinical practice as a polymicrobial disease.

Research Implications

1. Better understanding of the oral commensal bacteria, exogenous pathogens, and the dental biofilm (plaque) is key to developing biological arsenals against dental caries and periodontal disease.
2. Molecular biology provides the window to the oral bacterial community.
3. Recognition of the polymicrobial nature and etiology of dental caries may lead to better caries-risk detection markers than reliance on the presence of mutans streptococci or lactobacilli.

Policy Implications

1. Promote oral health literacy across the spectrum of health professions that dental caries is a transmissible infectious disease process that requires sophisticated management of the bacterial load.

Robert Berkowitz – Acquisition and Transmission of Mutans Streptococci

Clinical Implications

1. Assessment of the oral health of caregivers (especially the mother), and measures to manage oral disease in caregivers, should be a part of the clinical practice of early infant dental care and prevention.
2. Coordination of care with other health providers to initiate dental health strategies for expectant and new parents and their new children at the most appropriate times to protect children from high risk microbial acquisition should be a part of clinical pediatric dental practice.
3. Recognition that caries-experience in infants and young children is positively-related to the age at which mutans streptococcus colonization occurs suggests careful evaluation and follow-up concerning the use of cleft lip and palate obturators and other intraoral appliances in infants.

Research Implications

1. Find appropriate strategies to break the cycle of parent to child disease transmission.
2. Reassessment of the “window of infectivity” concept raises new questions concerning the role (if any) of passive immunity in vertical transmission of cariogenic bacteria.
3. Study strategies to reduce maternal transmission of cariogenic oral bacteria from mother to infant and assess the effectiveness of these strategies on infant oral health outcomes. Report on the cost-effectiveness of pre-natal and parental microbial strategies in reducing dental costs for the next generation.
4. Perform longitudinal studies of caries microbiology beginning at birth to fully characterize the microflora in varied populations.

Policy Implications

1. AAPD should consider further development of clinical guidelines and oral health policies for pregnant women and caregivers of infants and children.
2. Specific dental benefits under dental Medicaid and state Child Health Insurance Programs (CHIP), similar to that available to children under Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) guidelines, should be available to Medicaid-eligible pregnant woman. Create payment for a complete spectrum of dental services during pregnancy.

3. Promotion of the “age-one” dental visit and universal acceptance within and outside of the profession should continue to be a “first priority” for the Academy.
4. Disseminate guidelines for oral healthcare during pregnancy and early childhood. Increase awareness on the relationship between maternal oral health and infant oral health in publications, pamphlets, and other materials available to expectant mothers. Consider an educational campaign targeting obstetricians, general medical practitioners, nurse practitioners, midwives and other involved in pre-natal maternal health on the importance and implications of maternal oral health.

Lawrence Tabak – The Protective Role of Salivary Secretions

Clinical Implications

1. Increased attention to salivary function should be a part of caries risk assessment and management.
2. Clinical protocols should be developed or refined for the diagnosis and management of salivary disorders.
3. Increasing attention needs to be paid to the hyposalivary effects of common anti-anxiety, anti-depression, and attention deficit hyperactivity disorder spectrum medications used in pediatric populations.

Research Implications

1. Explore and establish the anti-salivary side effects of prescription and over-the-counter medications common to children.
2. Study the spectrum of saliva dysfunction, including constituency, gland structure and function, and immunology.
3. Identify clear markers for aberrant salivary flow or consistency that can be used in caries risk assessment.
4. Study the health implications of modifying the oral biofilm.
5. Investigate the potential of salivary diagnostics.

Policy Implications

1. Develop AAPD Clinical Guidelines for the identification and management of salivary disorders in the pediatric population, including those associated with commonly prescribed and over-the-counter medications.
2. Improve the knowledge of dentists and other health professional on the diagnosis and management salivary disorders through pre-doctoral and continuing education.

Diane Cummins – Industry Perspective on Preventing Oral Diseases in Children

Clinical Implications

1. Marketing efforts for consumer oral health products and devices alters public perception about oral health

and care. The marketplace influences the demand for, acceptance of, and compliance with professional oral health services and advice.

2. Development of effective products to manage oral disease still depends on effective packaging and marketing to gain consumer acceptance

Research Implications

1. Industry can partner with the research community to bring effective healthcare products to market.
2. Because of the costs involved, more collaborative research between corporate, governmental, and educational institutions is needed in developing new safe and effective products for preventing oral disease.

Policy Implications

1. Support policies and protocols that bring safe and effective products to market faster.
2. Professional organizations, including The American Academy of Pediatric Dentistry, should promote the translation of promising research into effective clinical care.
3. AAPD and the AAPD Foundation should explore opportunities to collaborate with corporate entities to disseminate oral health promotional messages to the public.

John Featherstone – Caries Prevention and Reversal Based on Caries Balance

Clinical Implications

1. Dental practice in the future will increasingly incorporate the medical model of addressing disease eradication and prevention, instead of relying on the surgical model of removing and repairing damaged or infected body tissue.
2. Clinical caries management will require employment of caries risk assessment, remineralizing agents, and antimicrobial therapy.
3. Increasing attention needs to be paid to the hyposalivary effects of common anti-anxiety and attention disorder spectrum medications used in pediatric populations.

Research Implications

1. Sophisticated and clinically-useful risk assessment tools measuring biological and bacteriological factors need further development.
2. Methods of delivering fluoride vehicles and antibacterial therapy appropriate for infants and children must be found.
3. Behavioral research into achieving patient compliance with home regimen recommendations will be key to achieving success with fluoride and biological approaches. Attention must be paid to ethnic, cultural, and socioeconomic considerations.

4. Demonstration of the cost-effectiveness of non-surgical approaches to dental caries management as well as demonstration of better long-term oral health outcomes is needed to support this approach.

Policy Implications

1. Dental school curriculum and clinical training must better reflect the medical management of dental caries, so as to carry this approach into clinical practice.
2. Incorporate caries risk assessment into the dental school curriculum
3. The profession should encourage and support the development of better reimbursement mechanisms, including third-party payment, for non-surgical caries management.
4. Reimbursement mechanisms will need to better acknowledge dental disease management strategies, including increased visit frequency and tests needed to characterize risk.

Steven Adair – Evidence-based Use of Fluoride in Contemporary Pediatric Dental Practice

Clinical Implications

1. Fluoride administration, both topical and systemic, remains the most widely proven and most easily administered caries preventive agent, especially in the very young child. Dentists must continue to appropriately prescribe and recommend topical and systemic fluoride, especially in vulnerable populations.
2. Recommendation for use of a fluoride-containing dentifrice for children less than 2 years of age should be based on caries-risk assessment.
3. Caries-risk assessment should determine the need for and frequency of professional gel / foam / varnish application.
4. A rotary-cup pumice prophylaxis is, in itself, an indication for consideration of subsequent fluoride gel/form/varnish application.
5. Fluoride varnish should be increasingly incorporated into clinical practice and, where the choice exists, may be more effective (and safer from a fluorosis viewpoint) than gel or foam.
6. The “halo effect” and “diminishing returns effect” of multiple fluoride sources should dictate fluoride recommendations only after careful assessment of caries risk.
7. Therapeutic fluoride use in children should maximize topical contact. Emphasize to care providers strategies that use low concentration but frequent contact application.

Research Implications

1. Effectiveness of fluoride varnish compared to gel and foam applications needs to be further examined. Effectiveness of all forms of topical fluoride application on the primary dentition is not well delineated and deserves further study.
2. Determine the “actual benefit” in prevented carious lesions of topical fluoride modalities in high, medium, and low caries-risk populations.
3. Revisit any benefit of prenatal systemic fluoride for high risk populations.
4. Study the risk/benefit of fluoride toothpaste in children under two years of age. Study the risk/benefit of high concentration fluoride toothpastes in appropriate populations.

Policy Implications

1. Consideration should be given to revising current systemic fluoride recommendations to be more specific to patient variables, including caries risk assessment. Supplementation recommendations should be more specific as to directions of use.
2. AAPD Guidelines should be reviewed for possible modification concerning recommendations for fluoride toothpastes, mouthrinses, and self-applied fluoride gels and rinses.
3. The “halo effect” and “diminishing returns effect” of multiple fluoride sources should be re-considered in developing AAPD Clinical Guidelines and Oral Health Policies. Therapeutic fluoride use in children should maximize topical contact.
4. Generally encourage the “off-label” use of fluoride varnish for appropriate populations by general dental practitioners
5. Promote fluoride literacy for all health care professionals, especially those who work with children. Promote public fluoride literacy to improve acceptance and compliance with appropriate fluoride recommendations.

Kevin Donly – Sealants and Their Role in Prevention

Clinical Indications

1. Appropriately selected and placed dental sealants are still an underutilized preventive strategy.
2. Sealant cost-effectiveness is increased by placement on high risk surfaces or surfaces that exhibit incipient lesions. Caries risk assessment is important in determining sealant indication.
3. Sealed teeth need periodic evaluation.
4. Sealant application over minimal enamel caries, as part of an overall caries management program, is effective at inhibiting lesion progression.
5. Indications for sealant placement may exist in any tooth with a susceptible pit and fissure at any age.

6. Enameloplasty, or removal of tooth structure in conjunction with the placement of a dental sealant, is not recommended as a routine procedure.
7. Use of a low-viscosity, hydrophilic bonding material as part of or under the sealant will increase sealant retention and effectiveness, especially on buccal or lingual aspects of the tooth.

Research Indications

1. Develop long term clinical studies examining the effectiveness of dental sealants in primary teeth.
2. Explore the use of new and emerging materials (glass ionomer and other non-resin based compounds) and techniques in sealant applications.
3. Quantify the cost effectiveness of public and private programs that apply sealants to all teeth meeting a certain eruptive pattern without regard to individual sealant indication.
4. Better determine the cost-effectiveness and oral health outcomes of sealing enamel caries.

Policy Indications

1. Create clear protocols (guidelines) for the placement of sealants in various caries-risk populations. Disseminate best practices for sealant decision-making, including application technique and long-term maintenance.
2. Increase the awareness of the dental benefits industry on the indications and cost effectiveness of dental sealants in any tooth at any age with susceptible pits and fissures. Encourage the development of third party reimbursement policies that recognize these indications. Establish policies that do not discourage active repair or long-term maintenance of sealants after placement.
3. Work with the dental benefits industry and the American Dental Association to develop guidelines and payment policies that recognize risk factors of patient population (i.e. patients with disabilities for whom restorative care must be provided with adjunctive pharmacologic management and for whom effective oral hygiene is problematic), as well as individual tooth anatomy, as indication for sealant placement. Include these payment policies in government benefits programs.

Maxwell Anderson – Preventing Dental Caries Using a Probiotic Approach

Clinical Implications

1. Practitioners should be aware of new and promising probiotic approaches to dental caries control that may eventually become part of clinical practice.

Research Implications

1. Laboratory and clinical research into mechanisms that selectively remove or effectively compete with

odontopathogens while rendering the remainder of the oral ecosystem intact represents an exciting frontier in caries management and prevention.

2. Analyzing public resistance to the introduction of bio-engineered or genetically-altered bacteria, and developing methods to overcome that resistance, is a fertile area for social research.
3. Promote research into the safety and efficacy of targeted antimicrobial agents.

Policy Implications

1. Promote widespread oral health literacy; dental caries is a transmissible, infectious disease process in which it is not only necessary to repair the resultant damage (cavities), but it is necessary to treat the causative agents.

Peter Milgrom – Using Sucrose/Fructose Alternatives In Pediatric Dental Practice to Prevent Dental Caries

Clinical Implications

1. Effective prescription or over-the-counter xylitol-containing products should be considered as part of an overall program of caries management to patients at high caries-risk and for care providers of infants at high caries risk.

Research Implications

1. Determine the amounts and practical dosage (usage) schedules of xylitol-containing consumer products in caries-reduction through long term clinical studies.
2. Resolve the mechanism by which xylitol exhibits a caries-inhibitory effect.
3. Develop additional xylitol consumer products effective in caries reduction and likely to be marketable and “consumer friendly” in terms of cost and ease of use.
4. Behavioral research into patient compliance with recommendations for xylitol use will be key to achieving success with this approach.
5. Develop realistic protocols for xylitol use.
6. Study the effects of long-term use of xylitol and other chemotherapeutic agents in infants and pregnant women.
7. Encourage and support labeling of xylitol-containing products in a manner sufficient to determine caries preventive potential.
8. Develop, in conjunction with the US Food and Drug Administration, the Centers for Disease Control and Prevention, and other appropriate agencies, the efficacious dose and frequency of xylitol use in caries prevention.
9. Promote the inclusion of effective caries-inhibitory products in the Medicaid formulary.
10. Promote sugar substitutes to clinical practitioners to reduce caries
11. Establish payment mechanisms for chemotherapeutic agents in the treatment or prevention of dental caries.

Sibylle Krantz – Diet Quality, Added Sugar and Dietary Fiber Intake in American Pre-schoolers

Clinical Implications

1. “Nutritional guidance” is an appropriate part of overall anticipatory guidance in pediatric dental practice.
2. Pediatric dentists can play a role in helping patients and their families achieve good overall health by improving diet quality.
3. Dietary recommendations for good oral health are consistent with recommendations for good general overall health

Research Implications

1. Clarify the role of dietary habits and sugar and carbohydrate intake in dental caries etiology in the pediatric population, particularly in early childhood caries.
2. Determine “best practices” for diet modification in infants, children and adolescent populations.

Policy Implications

1. Establish clear clinical protocols for nutritional guidance and dietary counseling in pediatric dentistry.
2. Clarify the proper role and responsibility of the dental health team in increasing dietary fiber density and reducing added sugars in the diets of preschool, elementary and secondary school diets.
3. Promote increased education of dental professionals in areas of nutrition.
4. Reconcile differences between dental health needs and general health needs in national dietary recommendations.
5. Collaborate with other pediatric and health organizations to promote healthy lifestyles and diet choices.

Philip Weinstein – Oral Health Promotion: What Works, What Does Not Work, and Why

Clinical Implications

1. Techniques of “motivational interviewing” should be considered in clinical practice to modify patient (or parent) behaviors.

Research Implications

1. Study “motivational interviewing” in the dental environment to answer questions regarding the efficacy and cost-effectiveness of this approach in caries control and prevention.
2. Conduct research into better understanding the ethnic, cultural, and socio-economic obstacles to compliance with oral health recommendations.
3. Identify “best practices” for achieving behavioral changes in pediatric patients and caregivers. Identify effective behavioral modification “triggers.”

Policy Implications

4. If studies confirm clinical benefit to dental application of motivational interviewing (MI), reimbursement mechanisms, including third party payment, will need to be brought into place. Increased exposure to the technique will be needed in dental education.
5. Promote, through dental education, current proven motivational techniques suitable in clinical practice.

David Albert – Tobacco Use by Adolescents and Teens: The Role of the Oral Health Professional in Evidence-Based Prevention and Cessation Programs

Clinical Implications

1. Pediatric dentists should evaluate their potential role in tobacco prevention and cessation education for patients and care providers.

Research Implications

1. Evaluate the effectiveness of tobacco prevention and cessation promotion in the dental setting to answer questions concerning the proper role and responsibility of the dental health team in this endeavor.
2. Identify effective clinical protocols that can be used in dental practice

Policy Implications

1. Develop Clinical Guidelines and Oral Health Policies for the pediatric dentist in tobacco prevention, cessation and education.
2. Establish mechanisms for reimbursement of tobacco prevention and cessation education programs in dental practice.

Wenyuan Shi – Nanotechnology and Chair Side Diagnostics

Clinical Implications

1. The future of caries diagnostics will rely heavily on new technology.
2. Practitioners should be aware of new and promising dental caries diagnostic approaches that may eventually become part of clinical practice.

Research Implications

1. Encourage highly sophisticated research by microbiologists, geneticists, physiologists and other “basic scientists” in dental disease diagnostics and treatment.
2. Identify and confirm in clinical practice effective, low cost dental diagnostic tools and therapeutics.
3. Study the effectiveness of diagnostic devices and physiologic measurements in the diagnosis of dental caries and dental caries progression.

Policy Implications

1. Universities, dental schools, research institutions, and industry should be encouraged to expend the resources necessary to support “basic science” cariology research.
2. The AAPD and ADA research agenda should reflect basic science research as well as clinical application research.
3. Reimbursement issues concerning sophisticated dental diagnostic tools and methodology must be addressed.

Copyright of Pediatric Dentistry is the property of American Society of Dentistry for Children and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.