

2012 Symposium on Caries in the Primary Dentition in American Indian and Alaska Native Children



Summary

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Summary

In November 2007, the American Dental Association (ADA) sponsored the American Indian and Alaska Native Oral Health Access Summit (<http://tinyurl.com/2007Summit>), which included a presentation on the high prevalence and severity of early childhood caries (ECC) in American Indian and Alaska Native (AI/AN) children. This presentation was made by a panel of tribal health representatives, dentists and pediatricians with extensive experience working in AI/AN communities. The panel reported there was no evidence that the ECC situation had improved appreciably despite decades of efforts by Indian Health Service (IHS) and tribal dental programs to implement all recommended caries prevention strategies for children. The principal conclusion of this panel was that adequate access to oral health care for AI/AN would never be achieved by only increasing the supply of dental professional staff and dental facilities. Decreasing the demand for dental services through more effective prevention programs was the only feasible, long-term solution.

Largely as a result of this panel presentation, in November 2009, the ADA sponsored the first Symposium on Early Childhood Caries in American Indian and Alaska Native Children (<http://tinyurl.com/2009Sym>). This meeting brought together a small group of tribal representatives, academic researchers and health professionals with decades of experience in preventive and curative services for children in AI/AN communities. Several hypotheses were advanced about potentially unique etiological factors that result in the very severe expression of ECC that AI/AN children experience. The meeting concluded with the suggestion that a larger, multidisciplinary group should be convened to explore the issues in greater detail, and Dr. Mark Crabtree, the chairman at the time of the ADA Council on Access, Prevention and Interprofessional Relations and meeting facilitator, said it was incumbent on the group to “raise its efforts to the next level.” This next level was achieved by assembling the October 2010 Symposium on Early Childhood Caries in American Indian and Alaska Native Children in Rapid City, South Dakota (<http://tinyurl.com/2010Sym>). At this meeting, fifteen experienced caries researchers in the U.S., representing ten prestigious research institutions, spent two days examining the best data available on the subject. The two-fold purpose of this meeting was (1) to identify the areas in which our current understanding of caries in the primary dentition (CIPD)* in AI/AN children is insufficient to make progress, and (2) to develop specific recommendations on how these knowledge gaps may be closed. The recommendations were grouped into four topical areas: epidemiology, microbiology, enamel hypoplasia and new products.

Subsequent to the 2010 symposium, in order to continue to guide this effort, the ADA supported a steering committee of four caries and dental public health experts plus a part-time

consultant. The committee prioritized the recommendations developed at the Rapid City meeting, and this prioritized list formed the basis for the February 2012 Symposium on Caries in the Primary Dentition of AI/AN Children. The steering committee recommended a new title for this initiative — The QUEST — which stands for **Q**uantifying, **U**nderstanding and **E**liminating **S**evere **T**ooth Decay in AI/AN children.

The proposed name also encompasses the underlying purpose of the four topical workgroups into which efforts are focused:

- **Epidemiology:** Quantify the prevalence, severity and morbidity from CIPD in AI/AN children, including developing new metrics to assess the different dimensions of the disease.
- **Microbiology:** Understand the etiologic factors that lead to severe CIPD in AI/AN children by reviewing all relevant existing data on the role of cariogenic bacteria and proposing additional areas of investigation to reduce knowledge gaps.
- **Enamel Hypoplasia:** Understand the prevalence and severity of developmental defects of the enamel as a predisposing risk factor for early onset and aggressive progression of CIPD in AI/AN children.
- **New Products:** Eliminate severe CIPD by exploring options for new caries-prevention products that may be more effective than those currently available.

The goal of the 2012 Symposium was to develop a detailed roadmap of the (1) specific actions required, (2) individuals and institutions that need to be involved and (3) timeline and resources needed to implement the prioritized recommendations of the 2010 Rapid City Symposium. Subject matter experts in each topical area provided their ideas about the specific items that needed to be included in developing this roadmap to guide future investigations. Following three presentations on the first morning on late-breaking information that was not available at the 2010 Symposium, the participants broke into the four topical workgroups, each of which was led by a member of the Steering Committee. The rest of the first day was spent discussing and developing a detailed operational plan for activities needed over the next 1–2 years. The next morning, each workgroup presented its plans in a plenary session, followed by extensive comments, questions and suggestions by all symposium participants. Below are the final recommended operational plans for the next phase of each of the four QUEST workgroups.

At the conclusion of the symposium, all of the steering committee members and the subject matter experts made commitments to continue in their current capacities through the next phase, which expected to last 1–2 years. Dr. Monica Hebl, vice chair of ADA Council on Access, Prevention and Interprofessional Relations (CAPIR), and Dr. Lewis Lampiris, CAPIR director, thanked the participants for contributing their time and expertise to this much

* There was considerable discussion at the 2010 Symposium and subsequently by the Steering Committee that the commonly used terms “early childhood caries” (ECC) and “severe early childhood caries (S-ECC) are officially defined in ways that have little utility for describing the disease burden from the extensive caries in the primary dentition that many AI/AN children experience. Until new, more useful terms are developed, this initiative will use the descriptive term “caries in the primary dentition” (CIPD).

needed work. They stated the ADA was pleased to have played a role in convening and supporting the three CIPD symposia. However, they also advised that ADA would not be able to play this same role in the future, and participants would need to look to other organizations for ongoing support.

Epidemiology Workgroup Plan

The published data on CIPD for AI/AN children indicate a very high disease prevalence and severity, but most of these data come from clinic encounter surveys. More recent non-clinic-based data (in press) indicate a range of severity among AI/AN communities in different parts of the U.S., but confirm the great disparity compared to the U.S. all races rate for many AI/AN children from the Southwest to Northwest to Northern Plains to Alaska. However, the Epidemiology Workgroup finds that currently available data sets and definitions are inadequate to describe the current disease burden from CIPD in AI/AN children and monitor trends over time.

General considerations that guide the work to be done in the next year include:

- Develop the definitions, instruments and systems to support on-going long-range efforts to reduce the disease burden that AI/AN children experience from CIPD. These new epidemiological products need to have utility and validity for internal goals and objectives.
- Given the age-specific nature of CIPD and the dramatic increase in severity of disease experienced by many AI/AN children over periods of only a few months, incorporate the age of the child into definitions and instruments.
- Ultimately, the definitions and metrics developed need to correlate with the short and long term morbidity children experience from this disease.

Recommendation 1

Develop new case definitions.

Action Plan		
Specific Actions		Completion Date
a.	Circulate a description of the 2011 IHS oral health dataset to all workgroup members.	Completed
b.	Create a summary (descriptive stats) of the most important variables.	Completed
c.	Determine the possibility of Workgroup using these data for development of a new definition.	April 2013
d.	Workgroup members will submit ideas on the components of a new case definition.	May 2013

Recommendation 2

Summarize current descriptive epidemiology and identify additional research needed.

Action Plan		
Specific Actions		Completion Date
a.	Identify individual to conduct a search for current published literature (including "gray literature") and reports that provide descriptive epidemiological data.	April 2013
b.	Produce a summary report of all existing data on CIPD in AI/AN children.	June 2013

Recommendation 3

Propose a better surveillance system for CIPD in AI/AN children.

Action Plan		
Specific Actions		Completion Date
a.	Identify federal and non-federal entities that currently collect epidemiological oral health data for AI/AN populations.	April 2013
b.	Review existing surveillance instruments and datasets.	June 2013
c.	Develop the specifications for a prototype surveillance system that would meet the need to assess trends in CIPD in AI/AN children.	June 2013
d.	Identify resources needed to implement and sustain the new surveillance system.	June 2013

Long-range plans include developing longitudinal studies to characterize risk factors and working in collaboration with the other workgroups (microbiology, enamel hypoplasia and new products) to develop cost-effective research interventions. To achieve these two plans, it will be necessary to shift the paradigm to a broader morbidity and population-based approach. This might involve looking at other clinical issues directly around teeth or broaden the view to include systemic medical, as well as dental, complications. A more comprehensive approach is needed.

Microbiology Workgroup Plan

It has been known for decades that the final common pathway of caries is enamel demineralization and cavitation caused by acid production by a limited number of species of oral bacteria. There are preliminary data that indicate many young AI/AN children have a high quantitative level of certain cariogenic bacteria, and these cariogenic bacteria constitute a very high proportion of the total oral flora. There are also published reports of AI/AN children having a much higher level of colonization and clinical disease at an earlier age for some of the common pediatric infectious diseases.

Recommendation 1

Summarize current state of knowledge of oral microbiology with respect to severe CIPD.

Action Plan		
Specific Actions		Completion Date
a.	This summary is currently in progress. A special edition of the <i>Journal of Dental Research</i> that will address this issue is expected later this year.	December 2012

Recommendation 2

Propose methods to characterize correlates of disease status and better methods to characterize total oral flora and caries risk.

Action Plan		
Specific Actions		Completion Date
Characterize the total oral flora among children from several AI/AN communities.		
a.	<ul style="list-style-type: none"> Identify and recruit interested researchers and institutions for an in-depth investigation. Determine the parameters and dimensions of such an investigation, including the number and distribution of sites, age range to be evaluated, severity level of caries, methods of assessment of cariogenic bacteria and caries, etc. Begin preliminary discussions with multiple AI/AN communities to promote awareness of the need, purpose and proposed methods of this research. 	January 2013
b.	<ul style="list-style-type: none"> Identify the most likely sources of funding. Develop the study protocol. Meet with multiple AI/AN communities to solicit interest in participation. 	June 2013
c.	<ul style="list-style-type: none"> Submit protocol for approval by the IRBs of record for the proposed study sites. Conduct proposed study. 	September 2014

Even though caries differs from the other diseases in several important attributes, it is plausible that there might be unique microbiological considerations for CIPD in AI/AN children. If the above preliminary findings are confirmed through investigation of multiple AI/AN communities and the level of cariogenic bacteria is strongly correlated with the onset and progression of caries, this would suggest that control of the colonization and replication of these bacteria in children might be an effective strategy.

Enamel Hypoplasia Workgroup Plan

Dental professionals working with young AI/AN children often report seeing children in whom the teeth progress from a non-diseased state to deep cavitation within only a few months. One possible explanation for this rapid progression of CIPD is that the tooth enamel may have had areas of hypoplasia in which colonization of cariogenic bacteria may occur more readily and, once colonized, the tooth is much less resistant to rapid demineralization. There are many published reports on children having different types of developmental defects of the enamel (DDE) of the primary dentition, and there are anecdotal reports of AI/AN children having areas of enamel that are not carious yet do not appear normal. However, there are no clinical or epidemiologic studies of enamel hypoplasia (EH) in AI/AN children, nor is there any consistent approach used for the diagnosis and documentation of this condition. The overall purpose of this workgroup is to assess the etiological role of EH and other types of developmental defects of the enamel as precursors for the severe CIPD many AI/AN children develop.

Recommendation 1

Propose a working definition of EH.

Action Plan		
Specific Actions		Completion Date
a.	Accept definitions and diagnostic criteria used in the <i>Modified DDE Index</i> (Clarkson & O'Mullane, 1989).	February 2012
b.	Conduct literature review (systematic review where possible) of following factors. <ul style="list-style-type: none"> • Association between EH and CIPD • Prevalence of EH and developmental defects. • Mother and child pre- and post-natal risk factors for EH and DDE. 	June 2013
c.	Determine the possibility of Workgroup using these data for development of a new definition.	July 2013
d.	Conduct pilot study to test protocol. <ul style="list-style-type: none"> • Identify study sites. • Develop assessment protocols. • Develop training and calibration protocols for examiners (consider using teledentistry). • Determine who will serve as examiners (community-based would be ideal). • Determine whether a partial mouth exam would be appropriate. 	July 2014

Recommendation 2

Propose a user-friendly screening protocol for non-dentists.

Action Plan	
Specific Actions	Completion Date
Note: Recommendation 1 must be accomplished first to determine the types of DDE causally related to CIPD and have quantified the risk.	Long-range

Recommendation 3

Identify a safe and accurate product or instrument to identify EH — ideally one that is appropriate for use in non-dental clinic community settings.

Action Plan	
Specific Actions	Completion Date
Note: Recommendation 1 must be accomplished first to determine the types of DDE causally related to CIPD and have quantified the risk	Long-range
a. Conduct literature review (systematic review where possible) of following factors. <ul style="list-style-type: none"> • If technology-assisted detection of porosity provides advantages in detection of enamel hypoplasia compared to visual screening. • Accuracy of methods (Must consider the high sensitivity/low specificity of many instruments) technologies. 	Long-range

The activities to be undertaken during the first one to two years of this effort will result in a better understanding of the risk factors for EH, its prevalence and its association with CIPD, all based on evidence available in the literature. The long-range plans include conducting a cohort study within the AI/AN population to determine risk and the integration of a practical system for on-going surveillance into usual practice. Development of the protocol and pilot testing will also take place during the first two years.

New Products

Workgroup Plan

There was discussion at the 2010 symposium that there is sufficient public health infrastructure for most AI/AN communities to deliver preventive services to most children on a regular basis. There is good evidence of this since virtually no AI/AN children develop the usual contagious diseases of childhood, such as measles, mumps, rubella, diphtheria, polio, Haemophilus influenzae type b meningitis, and others because of effective vaccination programs. However, many of these same children do develop very severe CIPD, because there are no prevention products that are effective for the children at highest risk.

The workgroup subject matter experts felt that the two products described below might be available within the next 1-2 years, and they show promise for reducing the prevalence and morbidity for CIPD in AI/AN children who, without additional interventions beyond currently available products, are at high risk to develop severe disease.

Recommendation 1

Evaluate clinical performance of silver-fluoride combination therapy, either in a combined product (silver diammine fluoride) or sequentially (silver nitrate solution followed by fluoride varnish) if silver diammine fluoride is not expected to become available in the U.S. within the next year.

Action Plan		
Specific Actions		Completion Date
a.	Compile existing clinical and safety data on silver nitrate/diammine and develop a summary of results.	June 2012
b.	Determine if SDI silver diammine product will achieve FDA clearance in time for testing.	
c.	Find investigator to lead multi-center clinical trial.	
d.	Develop preliminary trial protocol.	
e.	Recruit as collaborators 5-7 centers providing surgical restorations for extensive caries in young children.	October 2012
f.	Develop final protocol and estimate population size for trial.	
g.	Identify consortium of private funders for the preliminary work.	
h.	Apply for federal grant funding to conduct the trial.	

Recommendation 2

Evaluate the potential for glass ionomers to be reformulated for use as a smooth surface and pit and fissure sealant for the primary dentition.

Action Plan		
Specific Actions		Completion Date
a.	Contact formulators to request a specialized product designed for sealant use on primary teeth).	January 2013
b.	Develop a suitable delivery system for in-office and field application.	
c.	Field test prototypes for clinical suitability.	June 2013
d.	Evaluate the need and feasibility for a multi-center clinical trial.	September 2013

Appendix A

Agenda: Symposium on Caries in the Primary Dentition in American Indian and Alaska Native Children

ADA Council on Access, Prevention and Interprofessional Relations
in cooperation with Oral Health America

Pointe Hilton Tapatio Cliffs, Phoenix
February 6-7, 2012

Monday, February 6

7 a.m.	Breakfast
8 a.m.	Welcome Dr. Monica Hebl
8:10 a.m.	Traditional Blessing Dr. Fileberto Lopez, III
8:15 a.m.	Agenda Review, Format and Objectives Dr. Lindsey Robinson
8:30 a.m.	Symposium Background, Methods and Expected Products Dr. Dee Robertson
9 a.m.	Overview of Prioritized Recommendations from 2010 Symposium on Early Childhood Caries in American Indian and Alaska Native Children, Rapid City Drs. Bob Weyant, Don Marianos, Fred Eichmiller, Gary Rozier
10 a.m.	BREAK
10:10 a.m.	New Information Not Available at 2010 Symposium Drs. David Drake, Steve Duffin, Bob Weyant
11 a.m.	Topical Workgroups <ul style="list-style-type: none">• Select group recorder• Review methods and products expected from the workgroup• Brief presentations by subject matter experts to set the stage for discussion
Noon	Lunch
1 p.m.	Workgroup Discussion
3 p.m.	BREAK
3:15 p.m.	Workgroup Discussion
4 p.m.	Itemized Action Plans to Implement Recommendations <ul style="list-style-type: none">• Timeline and involved institutions and individuals• Paper copies• PowerPoint presentation for day two
5 p.m.	Adjourn
6:30 p.m.	Group Dinner

Agenda Continued

Tuesday, February 7

7 a.m.	Breakfast
8 a.m.	Traditional Blessing Dr. Fileberto Lopez, III
8:10 a.m.	Parking Lot Issues from First Day Dr. Lindsey Robinson
8:30 a.m.	Workgroup Presentations
10 a.m.	BREAK
10:10 a.m.	Workgroup Presentations
11:30 a.m.	Next Steps Dr. Lindsey Robinson
Noon	Adjourn
2 p.m.	Steering Committee Debrief with Subject Matter Experts <ul style="list-style-type: none">• Enamel hypoplasia workgroup Dr. Gary Rozier• Epidemiology workgroup Dr. Bob Weyant• Microbiology workgroup Dr. Don Marianos• New Products workgroup Dr. Fred Eichmiller

Appendix B

Participants

Joel Berg, D.D.S., M.S.	Professor and Lloyd and Kay Chapman Chair, Department of Pediatric Dentistry and Associate Dean for Hospital Affairs; University of Washington, School of Dentistry
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Page Caufield, D.D.S., Ph.D.	Professor, Cariology and Comprehensive Care; New York University, College of Dentistry
Ananda Dasanayake, B.D.S., M.S., Ph.D.	Professor, Epidemiology and Health Promotion; New York University, College of Dentistry
Sara DeCoteau	Tribal Health Coordinator; Sisseton-Wahpeton Oyate of the Lake Traverse Reservation of Northeast South Dakota
David Drake, M.S., Ph.D.	Professor; University of Iowa, College of Dentistry
Steve Duffin, D.D.S.	Private Dentist
Kevin Earle, M.P.H.	Executive Director; Arizona Dental Association
Fred Eichmiller, D.D.S.	Vice President and Science Officer; Delta Dental of Wisconsin
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The views expressed in this report reflect the opinions of the individual Symposium participants and are not to be accepted as views of the American Dental Association unless such statements have been expressly adopted by the American Dental Association.

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