2016 Symposium on Caries in American Indian and Alaska Native Children

Hood River, Oregon
August 26–27, 2016
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Note: The viewpoints expressed in the presentations in this report reflect the opinions of the individual Symposium participants and should not be considered the official views of QUEST or the organizations providing support for this Symposium. This report contains a few short explanatory “Editorial Notes,” which are the opinion of the Editor, and not necessarily the opinion of the author of the presentation.

* QUEST in AI/AN Children is a 501(c)(3) organization whose mission is to convene and focus the expertise and resources necessary to elucidate the etiology of rampant caries in the primary dentition in American Indian and Alaska Native (AI/AN) children, and to identify optimal strategies to prevent and control it.
2016 Symposium on Caries in AI/AN Children

Executive Summary

Background
This Symposium was the 6th in a series of meetings focused exclusively on defining, understanding and attempting to ameliorate the severe dental caries experienced by many young American Indian and Alaska Native (AI/AN) children. The impetus for these symposia started in 2007 with the ADA-sponsored Summit on AI/AN Access to Oral Health Care. At that meeting, Dr. Lindsey Robinson, a private pediatric dentist who was then Chair of the Council on Access, Prevention and Interprofessional Relations (CAPIR) of the American Dental Association (ADA), invited a panel of speakers to do presentations on the oral health status of AI/AN children. The energy and enthusiasm resulting from that series of presentations launched the subsequent efforts that continue to this day to improve the oral health status of AI/AN and other disadvantaged children.

In 2009 the first of three ADA-sponsored symposia1 was held in Phoenix, Arizona. It brought together a small group of tribal representatives, academic researchers, and health professionals with decades of experience in preventive, curative and restorative services for children in AI/AN communities. Several hypotheses were advanced about potentially unique etiological factors that result in the very severe expression of caries in AI/AN children.

The 2nd Symposium was held in Rapid City, South Dakota, in 2010. At this meeting Dr. Dee Robertson – the lead organizer – challenged the participants to address this fundamental question:

There is extensive anecdotal evidence that both the prevalence and severity of caries in the primary dentition in AI/AN children vastly exceeds that of the US all-races rate, and that for at least 20 years has been refractory to all efforts by skilled and dedicated Indian Health Service (IHS) and tribally-

1 The American Dental Association has generously agreed to host reports of the proceedings of all the symposia on its website: http://www.ada.org/en/education-careers/events/symposium-on-early-childhood-caries-in-american-indian-and-alaska-native-children.
operated program staff (hereinafter ‘IHS’ for short). Is this absence of improvement due primarily to:

1. A failure to consistently apply the dental public health approaches known to be efficacious, such as community water fluoridation, counseling on diet and hygiene, and appropriate use of caries control products such as fluoride varnish and xylitol; or
2. Are there fundamental gaps for both caries researchers and dental public health researchers in our understanding of this disease in very high risk populations of children?

The tribal representatives, IHS career pediatric dentists, and 15 experienced U.S. caries researchers representing ten prestigious research institutions spent two days examining and discussing the best data available on the subject. Their conclusion was unequivocal:

*The primary impediment to progress is that there are fundamental knowledge gaps in our understanding of this disease in this population.*

At the conclusion of the Symposium the participants categorized the knowledge gaps into four topical areas—Epidemiology, Microbiology, Enamel Hypoplasia and Efficacious Treatment Products—and made recommendations on how to close knowledge gaps.

Specific action plans were developed to address the identified knowledge gaps in the 3rd Symposium in Phoenix, Arizona, in 2012. Subsequent to this meeting, the organizers of the Symposium formed a 501(c)(3) organization called QUEST, whose name encompasses the mission of the organization: **Quantifying, Understanding and Eliminating Severe Tooth Decay in AI/AN Children.** QUEST has been the organizer of the last three symposia on this subject.

QUEST convened a 4th Symposium in 2013 which:

1. Reviewed the progress made in each topical area (epidemiology, enamel hypoplasia, microbiology and new products) toward the specific objectives set at the 2012 Symposium.
2. Proposed new activities that build on the knowledge and experience gained over the previous year.
3. Created a business plan that will support the activities identified as critical for moving forward.
4. Identified collaborations with organizations that have similar concerns about finding more effective strategies to reduce the morbidity from severe tooth decay for young children.
With funding support from the DentaQuest Foundation, a 5th Symposium in 2015 likewise built upon the progress of the previous years, but with three important differences:

1. There was substantially more representation than in prior symposia by career IHS dental and pediatric staff.
2. The sessions had more emphasis on measurable improvements in clinical outcomes, including reports of the results being achieved by clinical programs in the Pacific Northwest, northern tier states and Arizona.
3. In 2015 QUEST received substantial direct input and assistance from Dr. Patrick Blahut, DDS, MPH, then Deputy Director of the IHS Division of Oral Health. IHS had also expressed interest in receiving recommendations from the Symposium participants on policy issues to build on the progress recently made.

As in the past, the 6th and most recent Symposium (August 2016) emphasized that in order to make progress we must simultaneously be working on both (1) academic research and (2) clinical practice projects. The magnitude of the health disparity does not allow us to wait for years for the results of clinical trials before we try a different approach. On the afternoon of the first day there were reports of several QUEST-supported studies that will have immediate relevance to the on-going work of IHS programs. The second day featured reports of the clinical outcomes of innovative interventions supported by QUEST that are being used in a non-research clinical practice model. As reported, these projects are having a beneficial effect for AI/AN children right now. Equally important, evaluation of these projects is identifying the systems issues that are preventing them from achieving even greater success, and for which there are feasible remedies. At the Symposium, Dr. Patrick Blahut, then Deputy Director, IHS HQ Division of Oral Health (DOH), IHS continued to play an important role in organizing discussions around these topics. Other than that, the IHS DOH provided no support for the planning or convening of this year’s meeting.
DAY #1 PLENARY SESSION

Introductions and Welcome: Dee Robertson, MD, MPH

Dr. Robertson first introduced Ms. Wehnona Stabler, MPH, (Omaha Tribe) CEO of the health center of the Omaha Tribe in Macy, Nebraska. Ms. Stabler opened the meeting with a traditional blessing.

Next Dr. Robertson asked Dr. Patrick Blahut to present a brief overview on the oral health status of AI/AN children, as he has done in all the prior symposia. However, Dr. Blahut stated that this year he had not been authorized to present the observations he intended to share.

Presentations
Editorial Note: Many of the presentations had accompanying slides, and these are identified below as (Presenter_Title.pdf) following the title of the presentation. The below narrative description of the presentations is only a summary of the most salient points, and more complete information is available by viewing the full presentations in pdf format at: http://www.ada.org/en/education-careers/events/symposium-on-early-childhood-caries-in-american-indian-and-alaska-native-children.

Introductory remarks; Dee Robertson, MD, MPH; (Robertson_Introduction.pdf)

Dr. Robertson began his presentation with a favorite quote from a favorite book:

“If you don’t know where you are going... any road will get you there.”

He then confessed that in 2009 when he organized the first Symposium with support from the ADA, he definitely did not know where we needed to go to address the issue of severe tooth decay in AI/AN children. However, he did know that 25 years of his efforts and the work of many others had not resulted in perceptible improvements in their oral health status. At the conclusion of the 2009 Symposium, Dr. Page Caufield, a renowned pediatric caries researcher attending the meeting, called for the ADA to continue to support additional efforts to address the issues discussed by convening a larger group representing many different levels of expertise in the subject.

Two watershed meetings on caries in AI/AN children were convened in 2010: the formative meeting of the IHS Early Childhood Caries (ECC) Initiative, and the 2010 Symposium organized by Dr. Robertson and supported by the ADA. Both addressed the same

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2 Links to all the cited Symposium presentations are available on the ADA website
3 Alice in Wonderland; Lewis Carroll
fundamental issue – “Why are we not making progress in reducing severe dental caries in AI/AN children?” – but arrived at very different conclusions:

- The conclusion of the one-hour lunch meeting at which the IHS ECC Initiative was launched was: “We know how to control this disease! We just need to do a better job with the caries control activities that we know are effective.”
- In contrast, at the end their two days of presentations and discussion, the 40 participants at the 2010 Symposium – including tribal representatives, IHS dentists and physicians, caries researchers, dental public health experts and senior representatives from several DHHS agencies\textsuperscript{4} – concluded that there are profound knowledge gaps impeding our efforts to control dental caries in high risk children.

Dr. Robertson then stated that the overall purpose of the 2016 Symposium was to present what we have learned since the 2010 Symposium about achieving clinically significant reductions in the oral health disparities for AI/AN children. However, he emphasized that it was NOT the purpose of this symposium to promote any particular product or program or strategy. The goals for the meeting were:

- Make the case that it is morally unacceptable for such extreme levels of caries to persist in AI/AN children decade after decade.
- Identify the root causes of barriers to progress, as opposed to the ostensible barriers.
- Extirpate forever the illusion that strategies found somewhat efficacious in lower risk children should be expected to be equally effective for AI/AN children.
- Listen to encouraging reports of both academic caries research and a non-operative, non-invasive approach to caries in young children being used by several IHS dental programs that is making a clinically important difference in children’s lives.
- Develop guidelines for recommended programmatic actions for IHS and the many interested parties represented at the Symposium.

\textsuperscript{4} The National Institute of Dental and Craniofacial Research and Centers for Disease Control both sent representatives. Unfortunately, though invited, the IHS Division of Oral Health declined to send a representative to this Symposium.
Keynote Address: What do ‘owe’ each other: Moral Philosophy 101; Bob Weyant, DMD, DrPH (Weyant_Keynote Moral Philosophy 101.pdf)

Dr. Robertson introduced the Keynote speaker by noting that this year’s Keynote topic was prompted by Dr. Weyant’s recent distribution of a citation to an article in the New England Journal of Medicine by Perri Krass (“Saving Tiny Tim”), expressing that we have a special ethical obligation to do everything we can to address health concerns in the most vulnerable children.

Dr. Weyant began by highlighting the longstanding oral health disparity for AI/AN children compared to the US all races, and then reminded us of “The First Law of Health Care Improvement: Every system is perfectly designed to achieve exactly the results it gets.” (Donald Berwick) The implication is that if improvement is to be made in this pervasive health problem for AI/AN children, the ‘system’ that is currently supporting this discrepancy must be changed. He then cited a recent publicized report of the major impairments to children’s quality of life due to severe dental caries, and the lack of readily available dental health care services. This was followed by a range of comments selected from ‘the media’ – several of which could be interpreted as ‘blaming the victim’ in tone.

Dr. Weyant outlined the spectrum of philosophical perspectives on health care for children ranging from Libertarian to Utilitarian to Social Justice. At each point on the spectrum examples were given of the primary value and prominent advocates for that view:

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<th>Utilitarian</th>
<th>Social Justice</th>
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<td>Primary Value</td>
<td>More liberty</td>
<td>More utility</td>
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| Advocates | - Robert Nozick  
- Ayn Rand  
- Milton Friedman | - Peter Singer  
- Jeremy Bentham  
- John Stuart Mill | - John Rawls  
- Thomas Hobbs  
- John Locke |

Dr. Weyant then posed the question: “What are our obligations if we wish to live in a moral society,” and cited specific responses to the question from both the Utilitarian and Social Justice perspectives. In conclusion, he presented a schematic that encapsulates the dialectic of the relative cost–benefit and cost-effectiveness of the determinants of health, including a graphic showing how components of the health care system operate at various levels of determinants.
Dr. Weyant concluded his presentation by saying that, in his opinion, “all of us – clinicians, caries researchers, public health professionals and policymakers – have an obligation to work to fix the system that we are in.”

**Consequential epidemiology and essential public health dentistry; Eugenio Beltran, DDS, DrPH (Beltran_Consequential Epidemiology.pdf)**

Dr. Robertson introduced the next session saying that – similarly to Dr. Weyant’s Keynote – this presentation had been prompted by a recent paper he had received from Dr. Beltran, entitled: “An argument for a consequentialist epidemiology.” In this paper Dr. Sandro Galea presented the academic conceptual basis for the approach the QUEST Epidemiology Workgroup had already been moving toward for the last two years.

Dr. Beltran began his presentation by positing that oral epidemiology, along with medical epidemiology, has had an excessive emphasis on risk factors and causation of disease rather than epidemiology designed primarily to generate data for specific interventions to improve the quality of life of individuals. Specifically he noted that there are two different perspectives on this question: Should epidemiology be primarily focused (a) on validating or refuting prior epidemiological studies, or (b) on studies that will be the most beneficial action for improving our society. In the specific case at hand – severe dental caries in children – epidemiology should address how we define success, how we measure it, and which interventions will result in the greatest success.
Dr. Beltran noted that a recent World Health Organization meeting had focused on how caries in children should be addressed. It concluded that the most immediate actions needed are a case definition, better surveillance, integration of interventions within health care system, and reinforcement of the roles of fluorides, silver diammine fluoride, sealants – all of which are non-invasive approaches to caries in children. He added that his own ‘biases’ are to involve the leaders, move into action, decide on how to measure success, and work within the overall health care system as opposed to a separate and distinct ‘dental’ approach. Dr. Beltran defined the question of “What we do NOW” as the art of making decisions on providing services when the data supporting a particular therapeutic action is less than perfect. He concluded: “You need to bring it back to the point that if we are serious about doing something to help AI/AN and other very high risk children, we must have a focused surveillance mechanism that measures the effectiveness of the interventions we are doing in a way that the data are ‘centrally about improving health.’ The current one being used by IHS does not.”

BREAKOUT SESSIONS
Following these two plenary sessions, Symposium participants broke into two groups for the rest of the morning. Track A was facilitated and guided by Dr. Patrick Blahut. The first session was exclusively for the large group of IHS program direct care clinical dental staff. In the second session these IHS clinical providers met with the academic caries researchers attending the Symposium to review and discuss a number of technical and practical issues that had been identified and prioritized over the weeks prior to the meeting.

TRACK A DISCUSSION SESSIONS (Reported by Dr. Blahut)
Session #1: IHS and tribal dental program staff
The overarching purpose of this session was to provide the first discussion forum for the IHS program dental staff who for the last 1 – 3 years have been treating patients with an innovative non-operative approach, now generically called “the Warm Springs Model.”

Editorial Note: As seen in the Symposium Agenda, the Warm Springs Model was the main focus of the Day #2 of the meeting. The fundamental premise of this Model is that all recommended primary prevention strategies for caries in children continue to be emphasized by the dental program staff. However, when primary prevention fails, instead of utilizing traditional surgical restorations as the first option, the parents are given the choice of a medical management of disease utilizing a silver ion antimicrobial – either 25 % silver nitrate solution (SN) or silver diammine fluoride (SDF) – applied to the child’s decayed teeth. In the rest of this document for general references to ‘silver ion antimicrobials’ the term ‘SN/SDF’ will be used, while

5 QUEST is supporting projects in each of these topical areas – most of which were highlighted at this Symposium.
references specific to only one of the two will be identified individually as ‘SN’ or ‘SDF’ as appropriate.

Dr. Blahut informed the group of their two tasks for the session:
- Discuss specific technical and operational clinical issues of importance related to clinical use of SN/SDF for management of dental caries in AI/AN children.
- Prioritize a limited number of questions and issues to serve as the basis for the discussion with the academic researchers to be present at Breakout Session #2.

Outcomes of Session #1
Although there is a considerable literature on research using SDF to treat caries in children, there is little or no accepted evidence-based guidance for a clinical protocol. Further, the recommendations that do exist were made based on clinical trials that may have little generalizable ability to the day-to-day clinical practice of a very high risk group, such as AI/AN children. Thus, the initial discussion focused on specific clinical questions faced by the dental staff using this new Model, including:

- How does one prepare the other dental staff, medical staff, clinic administrative staff, and most importantly community members for the introduction of the SN/SDF management as an option in lieu of the traditional drill and fill restoration model?
- What are the characteristics of suitable candidates for this protocol?
- What message should be explained to parents concerning the staining of carious lesions that are treated with SN/SDF?
- What are the key indications that suggest the need to consider an alternative treatment, such as the use of stainless steel crowns via the ‘Hal Technique’? [See the Hort presentation on “Hall Crowns” on Day #2].

The IHS program clinicians generated a list of over twenty questions pertinent to use of the Warm Springs Model products (SN/SDF). The top five on the prioritized list were:
- Are there any credible data available to indicate whether either silver nitrate followed by fluoride varnish (SN/FV) or silver diammine fluoride (SDF) is relatively more effective than the other in the clinical setting?
- Is there a generally accepted set of clinically measurable criteria indicative of when a treated carious lesion has become arrested (i.e., no active progression of the lesion)? If not, what are the recommendations for a practical determination in the clinical setting?
- What clinical research has been done or is currently being done on SN/SDF in the U.S., and are there any credible clinical outcomes data based on this research?
- Were any of the published studies on SN/SDF done with populations of children who have a prevalence and severity of caries comparable to the AI/AN children we experience every day?
• What research issues and questions do you foresee being addressed in the near future regarding the use of SN/SDF in the treatment and management of caries in the U.S., and in particular in the treatment of very high risk children?

**Note:** For Session #2 – Indian health care clinicians meet with academic researchers – the organizer of the Symposium had instructed all concerned that this was intended to be a ‘collaborative learning experience;’ In short, no one was invited to this session to ‘school’ the others, but rather to share experiences and expertise. The academic researchers readily agreed that they had as much to learn from the IHS program clinicians as vice versa. In particular, the researchers were eager to identify new specific questions and issues in need of further investigation and research that would be most applicable to treatment of AI/AN children.

**Session #2: IHS and tribal dental program staff meet with academic caries researchers**

**Outcomes of Session #2**

Overall, our group thought the academic researchers were extremely helpful in clarifying key issues and defining entire subject areas for which there remain large knowledge gaps about the use of SN/SDF. These discussions made it clear that the failure of IHS and tribally-operated programs to successfully address the epidemic of very severe tooth decay in Indian Country over the last three decades has been in great part due to a lack of knowledge concerning key aspects of the disease process on the levels of both the individual patient and the community. To me [Dr. Blahut], it’s not clear whether it should be considered ‘encouraging’ or ‘discouraging’ that this was the exact conclusion of the 2010 Symposium on Caries in AI/AN Children ([http://www.ada.org/en/education-careers/events/symposium-on-early-childhood-caries-in-american-indian-and-alaska-native-children](http://www.ada.org/en/education-careers/events/symposium-on-early-childhood-caries-in-american-indian-and-alaska-native-children)) [Editorial Note: This Day #1 breakout session was followed immediately by reports of several QUEST-supported activities that are making progress of some of the specific knowledge gaps identified in 2010. See below.]

The researchers asked our front-line clinicians for specific “researchable questions” that would be of value to them, and received the following suggestions:

- How many applications of SN/SDF are necessary before reaching a point of diminishing returns? The IHS clinicians explained that they work in settings where resources are often inadequate for the overall needs of the population. Hence, a less intensive or demanding application sequence that would arrest “most of the lesions in most patients most of the time” may not only be more feasible, but also a better allocation of available resources.
- Which specific primary teeth respond best to SN/SDF agents?
- Is there a difference in effectiveness of these agents between the primary and secondary (permanent) dentition in children?
• When lesions in the anterior teeth have been treated with SN/SDF, what is the best method to mask the dark coloration for a more esthetically acceptable result?
• What is the most effective technique of applying SN/SDF to interproximal lesions that cannot be reached directly with a microbrush?
• What is the most effective way to manage open, cavitated posterior lesions that act as “food traps,” and thus are more resistant to SN/SDF therapy?
• Does the age of the patient – and presumably the degree to which the primary dentition is fully calcified – make a difference in the effectiveness of SN/SDF treatment?

In addition, the group discussed the issue of early access to care so that the caries in children could be (1) identified and (2) treated in the early stages before deep cavitation occurs. The consensus was that an unacceptably large number of children were not being identified early or seen in the IHS dental clinics soon enough for SN/SDF therapy to be a viable option. While the group recognized this was not, strictly speaking, a “researchable question” in the academic sense, it was noted that this very issue was likely the most important of all, given the high level of success of caries management with SN/SDF when initiated before the decay process was far advanced.

TRACK B PRESENTATIONS

This group included Symposium participants representing a number of perspectives and roles in the oral health care system, including dental public health experts, academic researchers not primarily involved with direct patient care, administrators and representatives of various agencies and non-profit organizations.

Setting the stage: An overview of underlying conceptual issues; Dee Robertson, MD, MPH (Robertson_Setting the Stage.pdf)

Dr. Robertson started by emphasizing that Symposium participants – especially those who do not work on a regular basis in the Indian health care environment – need to take what he called “the long view of history” perspective before we set our overall goals. This will allow us to have goals that are challenging, but also actually achievable in the world we work in. As an example, his first slide showed Goal #1 of the DentaQuest Foundation’s Oral Health 2020 Initiative:

“85 percent of children reach age 5 without a cavity”

While this is an altogether laudable goal for many populations of children, in AI/AN communities a still challenging – but more reality-based medium term goal – would be for 85 percent of the children to reach age 5 without requiring restorations and extractions under general anesthesia (GA). Currently, in some AI/AN communities – including several of those
represented at this Symposium – less than 75 percent achieve this, and it is not uncommon for the proportion of children who require treatment under GA to be higher than that.

Next Dr. Robertson reviewed barriers impeding measurable and clinically significant progress with this disease in AI/AN children. He first stated that, in his opinion, the largest current barrier is the lack of public acknowledgement by the IHS DOH of (a) the ongoing huge health disparity for AI/AN children, and (b) that the only credible reports of progress have come from a novel locally-developed project [the subject of the sessions on the morning of Day #2]. Rather, IHS DOH efforts are still focused on proxy process measures of little relevance, such as the current IHS ‘Dental Health Indicator’: the proportion of children with a dental clinic visit within the last year. Sadly, these are still being promoted in lieu of measures of improvements in the children’s quality of life, such as a reduction of children requiring invasive restorations in general and restorations and extractions under GA in particular.

Dr. Robertson then reviewed some of the academic research on caries in AI/AN children that has been published in the last few years, highlighting especially reports from the NIDCR-funded University of Colorado Oral Health Disparities Center, whose specific focus has been AI/AN children. In 2014, six years after the Center was established, this group published a report of their “Successful Initiation of an innovative community-based clinical trial [to reduce dental caries] in Navajo Nation Head Start Children.” This ‘successful initiation’ notwithstanding, two years later the same group published the actual clinical outcomes of their controlled trial: Zero improvement in the treatment group as compared to the control group. The authors concluded that “Successful approaches to prevention may need to be even more highly personalized and shaped by cultural perspectives…,” which Dr. Robertson paraphrased as “trying to do a better job with the strategies that have never worked before, and aren’t working now, but might work in the future if we keep doing them long enough.” He then reminded the participants that this had been the fundamental premise of the IHS ECC Initiative: “We understand this disease [caries in children] – we need only do more of what we are convinced works.” Seven years later there is no evidence of any clinically significant improvement from either the IHS ECC Initiative or the Colorado Disparities Center.

Last, Dr. Robertson briefly discussed the recently FDA-cleared “This Changes Everything” silver diammine fluoride (SDF), saying he has long been on record as being a strong supporter of the potential for silver ion antimicrobials like silver nitrate solution and SDF as safe, effective, feasible and acceptable secondary prevention agents. However, he is also highly concerned that the current commercial promotion of SDF may do more harm than

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6 Even though this product is marketed as ‘silver diamine fluoride,’ the FDA Product Classification shows the correct spelling (‘diammine’), and the formula (NH$_3$)$_2$ shows two ‘amine’ moieties – not ‘amine.’
good in that Indian health care dentists may begin using it believing that it really does “Change Everything,” and is The Answer to the problem. In reality, it is “another tool in the toolbox.” Like all other tools, the user needs to understand how to use it to get the maximal benefit, and gaining clinically relevant knowledge of the most effective and feasible way to use SN/SDF is a major objective for QUEST and this Symposium.

**Perspective of caries in AI/AN children by an IHS regional Chief Medical Officer; Stephen Rudd, MD**

Dr. Robertson introduced Dr. Rudd saying that the two of them had worked together for several years when he was the pediatric consultant to the Warm Springs IHS program. Thus, he knew that Dr. Rudd had long been aware of the magnitude of the problem of severe dental caries among the children there.

Dr. Rudd described his background as a primary care physician at the Warm Springs IHS Health Center for 20 years prior to becoming the Chief Medical Officer/Deputy Director for the Portland Area (the Pacific Northwest region of IHS). In addition, he is the Chairman of the IHS National Pharmacy & Therapeutics Committee. Dr. Rudd expressed strong support for the innovative approach developed and implemented by Dr. Mendoza [see Day #2 session below], which is now being referred to as the ‘Warm Springs Model.’ About three years ago he personally became involved in the implementation of this model by advocating on its behalf several times, including with the Area Dental Officer at the time. Dr. Rudd concluded by stating his appreciation for the efforts of all the Symposium participants for contributing their time and expertise to improve the oral health status of AI/AN children.

**DentaQuest Institute: ECC Initiatives; Cindy Hannon, MSW, and Mike Monopoli, DMD, MPH, MS** (Hannon-Monopoli_DentaQuest initiatives.pdf)

Cindy Hannon of the DentaQuest Institute described their ECC Initiative, which had been started at Boston Children’s Hospital in response to a large backlog of children in the queue for restorations and extractions under GA. The first step was to define what the desired approach was for the children, and compare that with what was actually being done. They found that there was a large gap between the two. In collaboration with St. Joes Hospital in Rhode Island, they developed and implemented a Disease Management Model – which emphasized focused prevention, assessment and management of risk, and support of behavioral change – and reported positive results. They used the Model for Improvement as the framework for their efforts, which emphasized measurable improvements in health outcomes.

Subsequently the DentaQuest ECC Initiative was expanded to Phase II, which was intended to test the Disease Management Model in a larger number of sites, and again reported positive outcomes, though with considerable variability among the five sites.
Phase III took this model a step further to include a mix of 32 federally qualified health centers, hospitals and private practices. From this experience, the Collaborative has implemented a ‘Virtual Practicum’ that will feature information on (1) measurement and data collection, (2) live webinars, (3) a “How to Guide,” and (4) Coaching for individualized support. This will allow much wider dissemination of the model.

Next, Dr. Monopoli briefly reviewed the DentaQuest Foundation Oral Health 2020 Initiative, which is built on the concept that “Oral health is essential to lifelong health and wellbeing.” The overall schematic he showed contained the wide ranging Goals of the DentaQuest Oral Health 2020 Initiative, with corresponding Targets for each Goal. It was impressive that all of these evolved from the core concept that “Improved health equity results in greater social justice,” which was in precise alignment with the Keynote Address by Dr. Weyant.

Improving oral health for tribal youth through community-based services; Connie Halverson. (Halverson_Community-based prevention services.pdf)

Dr. Robertson introduced Ms. Halverson by first expressing his appreciation for all the work she and Delta Dental of South Dakota (DDSD) have done in the last 20 years to foster and support projects to improve the oral health status of the American Indian children in South Dakota, including support for his own caries prevention project several years ago.

Ms. Halverson began by displaying a table that showed the remarkable disproportion in the number of children in 2013 requiring Medicaid-supported restorations and extractions under general anesthesia (GA) between the Eastern South Dakota counties served by DDSD (n=17) and the number from the five reservation counties (n=763). This disparity is consistent with the magnitude of the disparity for AI/AN children that QUEST has been highlighting for several years.

To address this huge disparity, DDSD applied for and received a Center for Medicare and Medicaid Services (CMS) Innovation Grant for a project involving a collaboration among 9 South Dakota tribes, IHS, the South Dakota Dental Association and Great Plains Tribal Chairmen's Health Board. The project employed 7 hygienists and 15 community health workers. Over the course of the project over 7,000 children were served with over 20,000 encounters. Accomplishments included:

- A major improvement (23% → 35%) in the proportion of reservation children who had a dental visit within the last year.
- Lower per child dental costs $600 → $450
- A lower proportion of children referred for surgery (28% → 8%)

Lesson Learned: With sufficient resources and coordination, prevention works – even with very high risk groups of children!
IHS ECC Initiative and results from the 2010 & 2014 Basic Screening Survey; Dan Huber, DDS

(Huber_IHS ECC project results.pdf)

Dr. Robertson introduced Dr. Huber as the regional Dental Officer for the Phoenix Area of IHS. Dee stated that his experience has been that most IHS regional dental officers are so preoccupied by administrative duties that they don’t have much time to dwell on issues like actual health outcomes. He then added, “Dr. Huber is different – he really ‘gets it’ about the need for us to evaluate the results of our efforts and not just assume that various prevention strategies work because an expert committee says they are supposed to work.”

Dr. Huber reviewed his experience over the last several years with the IHS ECC Collaborative and the emphasis on the principal interventions used. He then presented the process outcomes of each for 2010 – 2015.

Results:
- Number of interim therapeutic restorations (ITRs) increased from 800 –> 2000
- Number of sealants on the primary molars increased from 500 –> 2800
- Number of fluoride varnish applications increased from 3400 –> 6000

Despite these impressive achievements, in the same time period (2010 – 2015) the overall data for children’s caries experience showed:
- The mean proportion of 2 – 5 year old children with any caries experience increased from 57% –> 63%.
- The mean proportion of 2 – 5 year old children with any untreated caries increased from 36% –> 54%.

Dr. Huber’s conclusions were that:
1. It is surprising and disappointing that, though we were very successful in changing provider behavior on the three IHS ECC Initiative goals, we saw no improvement in clinical outcomes.
2. “We need to take a hard look at ‘what really works,’ and continually measure the health outcomes of our efforts in ways that reflect meaningful improvements in the health status of the children.”

Center for Medicare and Medicaid Services Oral Health Initiative; Laurie Norris, JD

Dr. Robertson introduced Ms. Norris as the Senior Advisor to the Center for Medicare and Medicaid Services (CMS) Oral Health Initiative, and said how fortunate we are that the Symposium has a key representative for this essential component of the ‘system’ needed to improve the oral health status of AI/AN children.

Ms. Norris briefly described the CMS Oral Health Initiative and the high level of interest in finding innovative ways to obtain greater value for the preventive and curative services for children at high risk for experiencing tooth decay. She told of the CMS collaboration with Denti-Cal for what is called the 1115 Waiver Project that encourages innovations such as the Warm Springs Model being used in selected IHS dental programs already. As the preliminary
outcomes confirm the safety and efficacy of this Model, she is eager to see it considered and adopted by other programs serving AI/AN and other children at high risk for dental caries.

**Rheumatic Heart Disease: a model for control of dental caries in AI/AN children; Steve Holve, MD** (Holve_Rhematic heart disease as a model for caries.pdf)

Dr. Robertson introduced Dr. Holve as being the Chief Clinical Consultant in Pediatrics for IHS, and a long term pediatric colleague who has likewise had a particular interest in caries control in AI/AN children. As an example, Dr. Holve initiated a regular fluoride varnish application for young children in his pediatric clinic long before most IHS dental programs were doing so. He has attended each of the five prior symposia representing the IHS pediatricians.

Dr. Holve began his presentation by stating that the medical pediatric health problem he was going to describe – rheumatic heart disease (RHD) – is in several ways analogous to the current situation with AI/AN children experiencing tooth decay that is so severe that it affects the quality of the lives. In past decades, RHD was highly prevalent worldwide, including in the U.S., in the 1950s. As recently as the 1970s it was common for pediatric hospitals to have a special “rheumatic heart disease clinic” because the specific issues involved with this disease. Since then, the rate of RHD has plummeted in most of the U.S., with the exception being AI/AN children, who continue to experience levels of the disease similar to children in some African nations.

Like severe caries in the primary dentition for children, RHD is a chronic disease in which there is a clearly defined early stage at which the actual morbidity from the disease is low, and in both cases there is an effective medication available that will arrest the disease and protect against further damage. Although the consequences of subsequent exacerbations of heart disease are more serious, the strategy is the same: Periodic treatment with an efficacious medication will stop the disease. The treatment is inexpensive and efficacious. We have successfully used that model for RHD for many years. What is needed to control severe dental caries in AI/AN children is an effective ‘system approach’ similar to that for RHD so we can (a) identify the disease in the early stages, and (b) track the children to ensure they get the appropriate medication at the appropriate intervals.
DAY #1 AFTERNOON: QUEST-SUPPORTED RESEARCH, PLUS RELATED REPORTS

Dr. Robertson introduced the sessions to follow as representing tangible progress in each topical area identified in the 2010 Symposium as having prominent knowledge gaps that have impeded progress: Epidemiology, Enamel Hypoplasia, Microbiology and Effective Interventions. The studies below were initially inspired by, and later supported by, QUEST and its organizational affiliates.

**Microbiome associated with severe caries in Canadian First Nations children: a Pilot Project; Bob Schroth, DMD, PhD, and Wenyuan Shi, PhD** (Schroth & Shi _Oral Flora of First Nations Children.pdf)

Canadian First Nations children experience a high prevalence of severe caries in the primary dentition just as AI/AN children do. As identified in the 2010 Symposium in Rapid City, there are knowledge gaps in our understanding of the microbiology of this disease in these populations. Until now, no one has done a study to determine whether the oral flora of indigenous children living in the same geographical area differs in a clinically significant way from the oral flora from non-indigenous children.

**Research Question:** What is the primary etiological factor resulting in high prevalence and severity or caries in Canadian First Nations children? Are there unique pathogens in the oral flora of these children, or known pathogens acting in a new way?

**Study participants:** Two groups of medically healthy First Nations and Métis children <72 months old (n=50) living in Winnipeg, Canada: (1) 20 caries-free, (2) 30 with severe tooth decay (S-ECC).

**Data collected:** Plaque and saliva samples, plus a questionnaire on health status, demographics and diet.

**Analysis:** DNA sequencing using the Forsyth HOMINGS (human oral microbe identification using next generation sequencing)

**Results:**
- Demographic: 17/30 (56.7%) of children with S-ECC lived in a First Nations community compared to 0/20 (0%) of the caries-free children.
- Fewer children were breastfed in S-ECC vs caries-free children (p=0.08)
- For those children breastfed, the duration of breastfeeding was greater for the caries-free children (p=0.01)
- The number of snack times between the two groups were very similar (p=0.71)
- The saliva samples had poor quality DNA, while the plaque samples quality was good.
- No unique pathogens were identified.
- Children with an oral flora containing ≥2% relative abundance of *S. mutans* were 11 times more likely to be in the S-ECC group.
Conclusions:
- In this sample of First Nations children, severe dental caries was not associated with any unexpected or unique oral bacteria species.
- Several children with severe caries had a much higher than expected relative abundance of two known cariogenic bacteria: *S. mutans* and *P. melaninogenica*.

Acknowledgments: This study received funding support from Delta Dental of Wisconsin.

Training dentists to use the Modified DDE Index to assess enamel defects; Margherita Fontana, DDS, PhD (Fontana-Dabiri_Assessing enamel defects.pdf)

Enamel defects are caused by disturbances in the formation of the dental enamel. There are several different presentations of enamel defects, including both quantitative and qualitative defects. Limited longitudinal research indicates that enamel defects are a substantial risk factor for the onset of caries because of preferential colonization of *S. mutans*. Hypoplasia in primary anterior teeth has been associated with prenatal smoking, excessive weight gain, low birth weight, and premature birth.

Objective: To design a questionnaire in order to assess the ability of practicing dentists to correctly identify and classify Development Defects of Enamel (DDE) as distinct from early dental caries

Long term Objective: Develop a field guide that dentists can use to accurately diagnosis and classify enamel defects, so that for young AI/AN children we can:
- Determine the frequency of enamel defects before caries starts in these areas.
- Document the rate of initiation of caries in enamel defects vs. sound enamel in order to determine the relative risk for new caries.
- Determine the effectiveness of caries prevention treatments in enamel defects vs. sound enamel.

Methods:
- De-identified images of developmental defects of the enamel were evaluated and scored as to the type of defect by a panel of experts.
- Consensus score used as the gold standard score in the evaluation of survey respondents.
- The survey of practicing dental staff was done electronically using Qualtrics.
- The survey was declared ‘Exempt from IRB review’ by the University of Michigan IRB.

Research Design:
Initially the intent was for dentists who practice in the Indian health care system to be the primary respondents to the survey.
- Data was anonymous and participation voluntary
- Agreement of each respondent’s score with the expert score evaluated using kappa statistics and percent correct
Unfortunately, a delay in approval by the IHS DOH required us to survey the membership of the American Academy of Pediatric Dentistry instead. Belatedly, a small number of IHS dental providers did take the survey, but the number was too small to support a meaningful analysis.

**Results:**
- From the AAPD members (N=6174) the response rate was 5.47%.
- There were significant differences in responses between participants and “expert panel” responses.
- For several of the images in the survey, less than 65% of the respondents made the correct diagnosis.

**Conclusion:**
Because we were unable to get enough responses from the intended dental providers working in Indian health care settings, we do not know whether they would have had similar levels of agreement with the expert panel. However, in a voluntary convenience sample of U.S. pediatric dentists, many respondents were unable to consistently (a) identify different types of enamel defects, or (b) discriminate between enamel defects, fluorosis and early caries. Thus, if the long term objectives of identifying and successfully treating enamel defects in children are to be achieved, many dentists are likely to require additional training.

Acknowledgments: This study was supported in part by funding from Delta Dental of Wisconsin and QUEST.

**A staging system for caries in the primary dentition; Dee Robertson, MD, MPH**

When individuals are initially diagnosed with any given disease, the first and most important thing they want to know is how it will affect the quality and duration of their lives. A large proportion of the young children in the U.S. have no caries in the primary dentition (CIPD). For many others it is a mild and asymptomatic condition—in short, it does not substantially affect their quality of life. Yet for many AI/AN children, CIPD substantially diminishes the quality of life due to symptoms of the disease itself and due to the extensive restorative treatment needed.

As was stated in the 1999 NIDCR Consensus Panel report on caries in children, the expected disease trajectory for a one year old child with a tooth cavity is much different than that for a five year old with a single lesion. This obvious – but rarely mentioned – difference was the driver for QUEST’s efforts to develop a caries severity staging system. Note that disease staging systems have been used for decades for dozens of ‘medical conditions’ – cancer staging being only the most widely known one – but not for dental caries.

Our proposed severity metric is called the ‘CIPD Level,’ and it is based on the dmft (decayed, missing, filled teeth) score in the primary dentition stratified by very small age brackets: <18, 18–23, 24–29, 30–35, 36–47, 48–59, and 60–71 months. Our basic premise is that this caries
staging system will demonstrate a correlation between the numerical CIPD Level scores and expected future morbidity —i.e., diminishment in the quality of life—for the child. A full description of this system was recently published in the Journal of Public Health Dentistry (Robertson, L. D. et al. (2016), A novel staging system for caries severity in the primary dentition. Journal of Public Health Dentistry. doi:10.1111/jphd.12164). The authors are actively seeking access to additional data sets with which to test our premise.

**Using electronic dental records to monitor caries prevalence in Alaska Native children; Tom Hennessy, MD, MPH** (Hennessy_Using electronic health records for epidemiology.pdf)

**Background**

The Arctic Investigations Program was asked to help the Alaska Native Health Consortium with data analysis on dental caries in children because of a very high rate of children requiring full mouth restoration under general anesthesia (GA) in some communities (400 annual GA cases for a birth cohort of 600 reported in one community). A 2008 report on Dental Caries in Rural Alaska Native Children included a set of recommendations, including a focus on establishing ongoing surveillance for caries in children as “data for decision making,” plus a tool for evaluating outcomes.

There are four sources of available caries data in Alaska – each with major limitations:

- **IHS Oral Health Survey**: The population of most interest – young children – is done only every five years; there are multiple examiners with minimal training and no calibration, and who have a high potential for bias. In any case, survey data cannot be used to assess the effectiveness of specific interventions.

- **Electronic Health Record (or electronic dental record)**. Different programs use different systems; the data are all from clinic encounters; the accuracy of the data is dependent on consistent and complete charting by multiple uncalibrated examiners.

- **GPRA (Government Performance and Results Act)** measures, which are required of all IHS programs; these contain only process measures, like the number patients accessing the dental clinics one or more times, sealants placed, and FV applications, etc., and tell us nothing about health status.

- **Head start dental exams**, which identify only children in Head Start. In some AI/AN communities, this represents only a small fraction of the children, and does not capture any quality of life measures such as toothache or traumatic restorations.

**Conclusion**

Given the magnitude of this health problem for Alaska Native children, we need to move to a smoother field-ready Oral Health Survey of value to dental directors and leadership. However, it is not certain whether there is demand for this within the local, regional or national administration of Indian health programs.
Update on the SMILeS Study of caries in Northern Plains children; John Warren, DDS, MS (Warren_SMILeS study update.pdf)

The original study was a prospective cohort study, part of a collaboration between the University of Iowa and a Northern Plains tribal community, whose initial overriding aim was to investigate the relationship between oral bacteria and caries in children.

**Methods**
- Expectant mothers and mothers with newborns were recruited from the tribal community during 2009-2010.
- Children were enrolled into the study at 1 month of age.
- Follow-up visits at 4, 8, 12, 16, 22, 28 and 36 months of age (+30 days).
- Surface specific dental caries examinations were made using the standard dmfs (decayed, missing, filled surfaces) criteria adapted from those used in NHANES.

In the process the study developed a robust dataset of the onset and progression of caries in children living in a Northern Plains American Indian community through 36 months of age.

**Results**
By 36 months of age 80% of the children had cavitated caries. If early non-cavitated (d1 level) lesions were included, 95% had caries experience.

**Current Project:** It has been over three years since the children in the original study have had any systematic follow-up exams of their oral health status, and all of these children will have emerging permanent dentition now. Starting next month [September 2016] we will identify and enroll as many of the original 235 children as possible, complete full follow-up tooth surface-specific exams on each, and document the type and extent of dental treatment they have required, if any, in the interim.

**Implications:** To our knowledge, this will represent the first longitudinal follow-up study of an individually-identified set of very high risk AI/AN children to document their dental health status over a several year period. Because of the extensive and detailed data we have from the original study, we will be able to assess the prognostic value of varying age-specific levels of caries on (a) future caries experience, (b) morbidity experienced from the disease itself and the treatment of the disease, and (c) expense to the health care system for invasive restorations.

**Acknowledgments:** This study received funding support from Delta Dental of Wisconsin, Delta Dental of South Dakota and Delta Dental of Iowa.

Effects of SDF on carious lesions of human deciduous teeth; Yihong Li, DDS, DrPH (Li_Use of SDF for caries in children.pdf)

Silver Diamine Fluoride (SDF, 38%) is a colorless solution with a high content of silver and fluoride [24.4-28.8% (w/v) Ag and 5.0-5.9% fluoride, at pH 10]. It is a cariostatic topical agent, with studies finding a caries arrest efficacy of ~70-83% in deciduous teeth and ~60% in
permanent teeth. The procedure is non-invasive, pain-free, convenient, time-saving, and low-cost. It does not require complex training of the health professional to apply, nor expensive dental clinic equipment, and can facilitate the caries management of young children because it is pain-free. It appears to have a great potential as an alternative to costly surgical methods.

The greatest disadvantage of utilizing either of the available silver ion antimicrobials (38% SDF or 25% AgNO₃ solution) is that both result in a permanent black stain in the diseased area. This can be especially unattractive if the anterior teeth are the ones treated.

Recent in vitro studies have clarified the way silver ion products work to control active caries, showing silver precipitation gets into the enamel and dentinal tubules. Images from a scanning electron microscope (SEM) clearly show a positive effect from SDF on reducing biofilm formation, including a significant reduction in S. mutans viability within the biofilm formation.

However, despite a robust literature on using SDF to arrest caries in children, many gaps remain in our understanding of the usage of these products in clinical practice applications. There is very little data comparing the clinical efficacy of SDF vs a silver nitrate solution. The only available reports are decades old, and may not be applicable to our current clinical practice.

There are a number of reports indicating that developmental defects of the enamel (DDE) represent a substantial risk for the initiation of caries in the primary dentition. Enamel defects are known to be associated with a variety of prenatal and postnatal conditions, and primary prevention of enamel defects may be essentially impossible to accomplish in the short term. Surveys have found varying rates of enamel defects in different populations of children. In Shanghai, China, a recent study of over 1000 children 3–6 years of age found that close to half of the children had identifiable enamel defects, and 60% were caries active.

Given that defective enamel allows greater colonization by cariogenic bacteria, with clinically apparent caries often the result, the question arises whether applying SN/SDF to areas of the primary dentition with enamel defects could be efficacious in reducing the colonization of these sites, and thus efficacious as a primary prevention of caries in the primary dentition. This is a fertile area for future research. It could also be evaluated through utilization in clinical practice settings based on the expert opinion of the treating dentist – especially if done in a prescribed protocol with careful documentation and follow-up exams.
Cutting the cutting edge; Jeremy Horst; DDS, PhD (Horst_Use of SDF for caries in children.pdf)

There have been a number of reports in recent years on use of SDF to arrest and prevent caries in children, and almost all have found a beneficial result when compared to placebo or other products alone. A 9-month follow-up evaluation of treatment with SDF was conducted of children in a clinical practice setting. The children varied widely in age at onset of treatment and number of applications of SDF. Overall, of 17 children who had before and after x-rays, there was evidence of progression of about 30% of the treated lesions, which was less than the matched control group.

Recent clinical experience with managing caries in the primary dentition with SDF and subsequently covering the treated lesions with glass ionomer cement (SDF+GIC = Silver Modified ART, or SMART) appears promising. There are multiple potential benefits from this approach, and appear to be few downsides to it.

Conclusion
At this point, for many children managing active caries with SDF, with or without covering with GIC, seems to be an attractive option compared to traditional restorations. However, there are still many knowledge gaps concerning which children, which ages, which teeth, which surfaces, what frequency and total number of applications are the best candidates for a successful outcome.

Clinical effectiveness of silver ion products for caries control; Margherita Fontana, DDS, PhD (Fontana_Use of SDF for caries in children.pdf)

SDF (38%) is a very potent fluoride that has antibacterial properties. When in contact with dentin, if forms Ag₃PO₄ resulting in a black, hard layer. It is inexpensive and easy to use, and studies confirm it ‘arrests’ active caries better than fluoride alone.

Currently evidence from both clinical experience and controlled research indicates:
• Caries removal does not offer any significant benefit in arresting caries, though food debris should be removed if present.
• The lesion should be dried and saturated with SDF, waiting about a minute before rinsing with water.
• Biannual application gives better outcomes than annually.

The University of Michigan School of Dentistry has an on-going controlled trial comparing SDF vs traditional restorative treatments in children:

Purpose: To evaluate the effectiveness, parent and child perceptions, dental providers’ opinions, and cost-effectiveness of SDF caries management in comparison to conventional restorative treatments.
• Enrollment: Randomization across sites of 98 total children at two sites
- Study Follow-up Period: 12 months
- Inclusion Criteria: Patients must be ages 2-10, with the presence of at least one active (soft) cavitated carious lesions in the primary dentition, extending into dentin (ICDAS 5 or 6)

Clinical Variables
- Lesions will be assessed on size (mm), dentin color (yellow, brown, black), dentin texture (soft, hard), periapical radiographs
- Success measured as Major (extractions, pulpotomies, etc.) and Minor Failures (caries progression, restoration needs repair, etc.)
- Parent and Child Questionnaires
  - Parent Questionnaires Baseline, 3 months, 6 months, 12 months
  - Child’s opinion of how teeth look, any pain, ease of experience during the dental visit, pain during the dental visit

Our preliminary findings (only 9 children treated at this time) are:
- Application Time is less for SDF (mean 6.3 minutes) vs Conventional (23.5 minutes)
- For 6/9 of the children in the protocol, providers found the SDF application preferable, 2/9 prefer conventional, and 1/9 had no preference.

Silver Nitrate Study to treat caries in children; Mike Kanellis, DDS, MS and Arwa Owais, BDS, MS (Kanellis & Owais_Silver nitrate study.pdf)

Purpose
The purpose of this randomized controlled clinical trial is to compare the conventional approach of restoring caries in the primary dentition to medically managing caries using a silver nitrate solution followed by fluoride varnish protocol. The study population was Amish children living in Kalona, Iowa. The average family has 8 children who have a high caries rate, low exposure to fluoride, and limited access to and utilization of regular dental care. The study enrollment occurred between November 2014 – May 2015, and 18 month recalls are now moving forward.

Baseline and outcome measures are collected from direct reporting by parents and children including Child/Parent questionnaires. Clinical exams are done along with blinded radiograph assessment. Variables of interest are:
- Incidence of new caries (clinical and radiographic)
- Pain or infection
- Patient quality of life
- Cost-effectiveness
- Acceptability of treatment strategies.
Study medication schedule
For the treatment group, 25% silver nitrate solution is applied directly to the carious lesions once a month x 3, with each treated lesion covered immediately by 5% fluoride varnish. Once every 6 months all the teeth are treated with a fluoride varnish application. The control group receives conventional restorative treatment.

Results to date
The mean (SD) baseline age of the study children was 7.1 (2.2) years; dmft 4.4 (2.8); and dmfs 9.2 (8.6). Approximately 75% of the children had only 1–2 teeth that were treated. The assessment of caries (both clinical and radiographic) at the 18 month recalls is finding that a substantial proportion of the children in each group have new carious lesions: 17/30 (56.7%) in the treatment group and 5/16 (31.3%) in the control group. The new lesions are largely interproximal and based upon radiographic findings. In the treatment group, 8 children are classified as having had a ‘major failure,’ defined as resulting in the need for a tooth extraction, compared to only 1 in the control group.

Lessons Learned
• Open lesions that pack food are not good lesions for silver products alone.
• Lesions that are encroaching on the pulp are not good lesions for silver products.
• Silver nitrate “bleeds” onto other surfaces. This can lead to “black” white spot lesions on permanent teeth. Given the wide agreement that silver ion products like SN/SDF do not stain healthy enamel, it is not known whether the stain spots on non-treated teeth may have been areas of qualitative enamel defects or pre-clinical demineralizations from caries.
• Interproximal application is a challenge. Using “picks” and “superfloss” are problematic.
• Our findings are that for this population of children the study protocol we are using is not effective in preventing new caries in non-treated teeth, nor is it completely effective in arresting existing deep carious lesions.

Conclusion: It is important to not view silver products as “either/or” for treatment of caries in children, but rather as ‘another tool in the toolbox.’
Day #2 PRESENTATIONS
Reports of clinical practices that are using silver nitrate or silver diammine fluoride (SN/SDF) as part of a non-operative initial approach for children with caries

A non-operative approach to caries in children in an urban clinic; Moffett Burgess, PhD, DDS (Burgess _Non-operative treatment of caries.pdf)

The speaker updated her presentation done at the 2015 Symposium on her experience treating high risk children in a FQHC in Seattle. Prominent points included that she continues to emphasize all the standard primary prevention strategies. However, she said that “for complex operational reasons,” when primary prevention fails, she no longer is managing caries in the children with a combination of silver nitrate followed by fluoride varnish. There were no safety concerns, and she indicated that it was generally about 75% efficacious in both medium and long term arrest. No data were presented to allow inferences on the correlates for failure, but she felt that continuation of a cariogenic diet was a major factor in recurrence of new caries.

“Hall Crowns” for treatment of caries in Alaska Native children; Kim Hort, DDS (Hort _Use of Hall Crowns for caries in children.pdf)

This report covered the speaker’s experience as the pediatric dentist for the Southeast Alaska Regional Health Consortium (SEARHC) in using stainless steel crowns placed atraumatically to treat caries in children by what is now called the ‘Hall technique’ (or ‘Hall crowns’ for short). Good population-based data are not available for the prevalence and severity of caries in children in this region, though anecdotally it is considerably lower than that experienced at other Alaska Native health care programs.

“Our program relies on primary dental health aides (DHAs) in each community to see all high risk patients every four months. We emphasize minimally invasive dentistry, and have been utilizing silver diammine fluoride (SDF) for several years in selected children. However, consistent follow-up is a problem, especially for children who do not live in the immediate Juneau area, and we have experienced a number of failures from use of SDF alone. Because of this, increasingly I have begun to use stainless steel crowns placed atraumatically by what is being called the Hall Technique (aka, “Hall Crowns”) for the following type of children:

- Very young children, especially those whose 2nd molars have not erupted.
- Children with only 1-2 quadrants of decay.
- Semi-cooperative children (age, anxiety, or cognitive impairment).

My experience has been that when placed on asymptomatic and vital teeth, these are successful in most cases, and they survive the lifetime of the tooth. Use of these Hall Crowns is considerably decreasing the proportion of these children who require restorations and extractions under general anesthesia. In deciding whether to use this treatment option vs others, for each child I consider:
• Symptomatic vs asymptomatic
• Depth of lesion
• Patient tolerance for treatment
• Ease of coming to clinic
• Parental preference

In 2015 our program almost doubled the number of children treated this way. Nonetheless, it still represents only about 5% of the total number of children treated with SSCs – most of whom are still treated in the operating room, and the remainder in the clinic setting.”

Concluding thoughts:
• Parents and patients are happy to avoid local anesthetic and sedation, even if that means risk of crown loss.
• Hall Crowns are a good treatment option for children with moderate to large, asymptomatic single or multi-surface carious lesions on posterior teeth.

Using the Warm Springs Model medical management of caries at Macy, Nebraska; Joseph Churchill, DDS (Churchill_Warm Springs Model for caries in children.pdf)

Since 2012 I have been the sole dentist at the Omaha Tribe Clinic in Macy, Nebraska. As soon as I arrived, I came face to face with the severe caries many of the children were experiencing. In response, I became a participant in the IHS ECC initiative, and in collaboration with the local Head Start and WIC programs, I implemented all the primary prevention strategies recommended by the IHS ECC Initiative, including oral health instruction, fluoride varnish, xylitol products and sealants, and use of ITRs when feasible.

Despite all this, I could see no obvious or clinically significant improvement in the children’s oral health over time, and I had to make an average of over 5 referrals monthly to the pediatric dentist from 2012 – 15. Even more children were identified in my Head Start screenings, but many times these children did not come back for follow-up. I often see young children who have caries on almost all their teeth except for the mandibular anterior teeth.

By good fortune, my Chief Executive Officer – Ms. Wehnona Stabler, MPH – had met with Dr. Robertson when she was at Pine Ridge several years ago, and had been very interested in the medical management of caries model developed at Warm Springs. I and my hygienist and dental assistant visited Warm Springs, and we were much impressed with both the results Dr. Mendoza was achieving and the very positive response of the children and parents. We initiated this Model in our clinic in June 2015 and have been using it ever since. We are documenting all our treatments and clinical exams in the same database used by Warm Springs the other sites using this model.
**Overall impressions:** Overall, this has been a valuable option to offer to the parents of young children with caries. I do fewer traditional restorative procedures (Happy children!) and fewer referrals to the pediatric dentist. Like Dr. Mendoza, I am seeing a “collateral benefit” of mild staining on nearby teeth that were not treated directly, and that appeared normal at the initial exam. And best of all from the dentist’s perspective, acceptance by the children, families, community and staff have been excellent.

I believe the largest problem has been our inability to get the children back when scheduled for follow-up. The best solution for this would be an active, structured collaboration with the medical program such that children in the protocol are identified when they have medical visits, and a brief assessment is made there as to whether the child needs to be referred to the dental clinic for follow-up.

**Using the Warm Springs Model medical management of caries at Blackfeet IHS clinic; Gary Pannabecker, DDS** (Pannabecker_Warm Springs Model at Blackfeet.pdf)

I have served at the same IHS program in Browning, Montana, for the past 19 years. Like the other sites represented here at the Symposium, from the first day I arrived I have been concerned about the high proportion of children who experience early and severe tooth decay – many of whom require treatment under GA. In order to control this disease, we participated in the IHS ECC Initiative from 2010 – 2015 with an emphasis on primary prevention, including:

- Quarterly fluoride varnish treatments for children in Head Start and Early Start.
- Sealants and interim therapeutic restorations (ITRs) on primary teeth.
- Preferred access for 0-5 year olds.

We have consistently had a high level of performance on the IHS ECC Initiative process objectives, but with no discernible reduction in either the prevalence or severity of the disease. Prior to entering kindergarten, 65% of the Blackfeet Reservation children ages 0-5 years have caries experience, 35% have untreated caries and 30% have treated caries. Common patterns of caries in children include:

- Decay by age 1-3: children with very aggressive disease that starts when the teeth erupt and eventually involves most areas of the dentition.
- Despite comprehensive dental treatment on the primary dentition, first permanent molars often need complex restorations or extractions upon eruption or shortly thereafter.

During a site visit to Warm Springs with Dr. Blahut in November 2014, I became convinced that the Warm Springs Model non-operative approach would be a much needed and viable option for many of the children who receive care at my clinic. We became the first beta site in January 2015, and are following the same silver nitrate followed by fluoride varnish protocol used at Warm Springs.
Overall impression:
Although initially we had planned to use the SN/FV for only the primary dentition, we are finding it useful and effective for the late mixed dentition as well. This new approach has been well accepted by patients and families, but communication with the parents is essential so they will understand why we are offering this new approach. The SN/FV combination has been highly efficacious in arresting caries in the primary dentition. Just delaying operative restorative treatment until cooperation improves or primary tooth eruption is complete can be a positive outcome. The primary limitations we have noted are:

- It is less effective for deeply decayed teeth and interproximal lesions, which are hard to get to.
- Patient compliance in following the multiple visit schedule has been an issue, but this is always a problem regardless of the treatment approach.
- We have had no complications other than occasional silver nitrate stains on hands and clinic countertops.

Cass Lake outreach-based implementation of the Warm Springs Model; Lori Snidow, DDS (Snidow_Outreach-based Warm Springs Model.pdf)

Overview
Our Cass Lake [Minnesota] program serves a large population in 12 sites over a fairly large area, with some sites being an hour’s drive or more. We requested to become a beta site of the Warm Springs Model because approximately 25% of our young children were requiring restorations and extractions under GA, and we thought we could reduce this number with the medical management of caries model. We initially had hoped to enroll up to 1000 children in this new model in the first year because of our ready access to the children through the Head Start programs and schools. However, we preferentially selected the more remote sites for the ones to implement the protocol because children in these communities were the most difficult to get in for traditional restorative care.

Outcomes
Primarily because of logistic issues, we had limited enrollment into the protocol. We repeatedly had to deal with making long trips, but finding only a few of the children in the protocol were available when we arrived. We were unable to ensure that the children did not have food or drink immediately after the treatments were done. Also, in the school or Head Start setting, we were very limited in the amount of ‘face time’ with the parents to emphasize primary prevention strategies. Last, our facility CEO was concerned that the parents might object to have the anterior teeth become stained from the silver nitrate, so we were limited to treating the molars, which are reported to be less well controlled by SN/SDF.
Results
We were able to enroll only 33 children into the protocol. The average age of the participants was 4.2 years at enrollment. We had a high rate of failures with some lesions failing to arrest, some appearing arrested and then becoming active again, and some new lesions on previously non-carious teeth.

Future options
We plan to continue to use SN/SDF for selected cases, including those children who have carious teeth expected to exfoliate within the next 6-8 months, and those waiting to go to the OR. However, we will not be using it as a first option.

The silver nitrate protocol at the Hopi Reservation; Mary Beth Johnson, DDS, MPH
(Johnson_Warm Springs Model at Hopi.pdf)
The Hopi Health Center serves the Hopi Nation in the geographically isolated northeastern part of Arizona. We face similar challenges and barriers to care as have been presented previously, including poor diet and oral hygiene, parents with uncontrolled dental disease, young children with rampant caries and treatment anxiety, and complex family structures. Previously we have been trying to control the rampant caries in children by participation in Performance Improvement Projects and the IHS ECC Initiative. We have been successful in increasing the process measures such as the number of dental clinic visits for children through age 2, with a 140% increase in exams and 300% increase in treatment completion compared to baseline. We do fluoride applications at every visit, and are using more glass ionomer sealants, and ITRs (295% increase).

Despite the above, many children still developed early and aggressive caries. Based on a recommendation by Dr. Dan Huber, Area Dental Officer for the Phoenix Area of IHS, we became a beta site of the Warm Springs Model. We hoped to achieve results similar to Dr. Mendoza at Warm Springs, including reduced need for invasive restorations in general and especially under GA. We initiated the Project in 2015, and we present the SN/FV protocol as an option to the parents of especially young children with caries. At present we have enrolled 50 and have 43 children who are still active in the protocol. A lot of our young children present to the clinic with demineralization lesions that are not yet cavitated, and we are managing these with the same protocol.

Results
After application of the protocol, nearly all treated demineralized lesions remain stable and do not progress to cavitated caries. Most carious anterior smooth surfaces arrest readily, but arrest of caries in the molars depends on cleansable area and lack of food impaction. It seems to work best in the younger patients with smaller lesions. I’m getting follow-up X-rays when possible, and I’m finding that some of the treated lesions show progression and some do not. Clinically, even without full apparent arrest, the caries feels altered to touch.
Clinical Impressions
The Positives:
- Cooperation generally improves and anxiety generally decreases.
- Parents seem pleased, and few find appearance too objectionable.
- Non-cavitated demineralizations tend to not to progress.
- Delaying the need for restorations under GA can be beneficial.
- Could be used in conjunction with ITRs and Hall crowns.

The Negatives:
- Adherence to the chosen multi-visit protocol regimen is challenging.
- Not all lesions arrest, and thus surgical restorative care is still often needed.
- Radiographic decay is sometimes found at subsequent exams even though not seen during the clinical exam.
- Poor oral hygiene, a common situation with many of our children, decreases the effectiveness.

Development, implementation and 3-year results of the Warm Springs Model; Frank Mendoza, DDS (Mendoza_Development of the Warm Springs Model.pdf)

Background
Historically greater than 90% of Warm Springs [Oregon] Head Start age children (3 – 4 years old) had caries experience. On average annually from 2010 – 2013 about 80 of the community’s children (yearly birth cohort ~ 110) required treatment for caries under general anesthesia (GA). This is at least 5000% higher than the US all races rate, and until 2013 had not changed for decades. We had done all the primary prevention strategies recommended by the IHS ECC initiative, and had very good scores on the process measures such as early access to care, fluoride varnish, GIC sealants, and ITRs, but no clinically significant improvement in prevalence or severity of decay.

In 2012 we learned that some dentists in Oregon were using 25% silver nitrate solution to arrest active caries in children, and concluded it would be safe and likely enhance the effectiveness of our current program. We had strong support from the local tribal health advisory committee, Head Start, and Dr. Miles Rudd, the Portland Area IHS Medical Officer.
We emphasized to all concerned that this new approach was being offered to parents based on the expert opinion of the pediatric dentist – not as a research study.

Outcomes
We have enrolled 210 children, and 196 are still in the protocol. Only a couple of parents have chosen traditional restorations instead. The parents have been consistently pleased, and the children have been very easy to work with. In contrast to the universal experience of dentists treating children, the younger children are generally more cooperative in subsequent treatment visits instead of more fearful and difficult to work with.
We have greatly reduced the number of invasive restorations of all kinds, and now the great majority of restorations we do are either for esthetic purposes or use of glass ionomer cement to fill the cavity after it has been arrested by the silver nitrate. We have reduced the proportion of children who require restorations and extractions under general anesthesia (GA) by 50% overall, and less than 5% of those children in the protocol progress to require GA. Those who still do require treatment under GA fall into one of two groups:

1. Children who were not brought to the dental clinic until their disease was so advanced that there is no other option.
2. Those who were briefly in the SN/FV protocol, but did not return for follow-up for a year or more, and who now had advanced disease – often in teeth that were not erupted or not carious at their initial visit.

Unexpected results: “collateral benefit”
On follow-up exam after two or more treatments, over half the children have visible evidence of faint staining on small parts of teeth that appeared normal at the time of the first exam, and which were not directly treated. This occurs despite meticulous attention to applying the silver nitrate solution only to the affected area of carious teeth. Our assumption is that these mild stains in untreated teeth are occurring because these teeth had some demineralization of very early caries that was not apparent to the examiner, and that the silver ions are being deposited in this damaged enamel. In the coming year we will closely evaluate whether the stained areas – which we now refer to as “collateral benefit” – are caries-resistant.

Conclusion
Our 3-year experience indicates strongly that this option is a better approach for many young children than anything we have ever had to offer. There are still many things we do not yet know about this new model of care – specifically, which children, which ages, which teeth, which surfaces, what frequency and total number of applications are the best candidates for a successful outcome. But we are continually learning more about this from our clinical practice. Some things that are absolutely certain are that:

- It’s safe, fast, easy and inexpensive.
- For many young children it works.
- The dentists like it.
- The parents like it.
- The kids love it!

A CEO’s perspective on the Warm Springs Model of care; Wehnona Stabler, MPH
I have now had experience in three tribal communities with trying to implement the Warm Springs Model of medical management of caries to control severe tooth decay in American Indian children. When I was the CEO of the Pine Ridge IHS program in 2010, I learned of this model from Dr. Robertson, and was very interested and supportive. We had a desperate need for a better approach because at that time as we had about 300 children on the
operating room waiting list for extensive restorations and extractions. Unfortunately, the local IHS pediatric dentist (and Acting IHS Aberdeen Area Dental Officer) there at the time stated in a public meeting that she would “do everything in her power to block this,” and she did exactly that. Two years later I was the CEO at the Standing Rock Sioux IHS program, and had a young dental officer who was interested, but again the IHS Area Dental Officer was still obstructive. Dr. Robertson and I felt that we did not have the necessary support and infrastructure to make it work there.

Some months later I left the Indian Health Service and became the CEO of the health program for my own Omaha Tribe in Macy, Nebraska. Again, I had a young dentist (Dr. Joseph Churchill) who was interested and willing to learn and to be innovative, so I sent him and two other dental staff to visit Warm Springs to get a full exposure to this new approach. After Dr. Churchill’s return, I met with tribal council and received support from them for offering parents the option for a non-invasive approach using silver nitrate solution to treat the active caries. We partnered with the local Head Start program to facilitate identifying the children and following their progress. The results have been highly positive, though we still need to do a better job of getting the follow-up exams done in a timely way.

**Recommendations**
- Respect the tribal differences: Understand the cultural context of the tribe, which is not to mutilate the body.
- Continually work to build a relationship, which is difficult if you are an “outsider.”
- Engage the leaders! Just keep repeating the message! Be persistent!
- Move away from trying to engage IHS at the national level and consider working directly with the tribes.

**Perspective of the Warm Springs Model by a tribal community Head Start coordinator; Ryona Trimble**

I have worked with the Warm Springs [Oregon] Head Start program since 1985, and am currently the Health Coordinator for the program. For years I have been working to build a good collaboration between tribal Head Start and the IHS Dental Program. We participated in the baby bottle tooth decay initiative many years ago, including encouraging parents to wean their children from the baby bottle no later than age 12 months. We tried to implement the xylitol gum initiative that was popular about ten years ago, but “had to fight with the kids” to get them to spit out the gum! Nothing we tried seemed to make any difference – most of the children developed severe tooth decay anyway.

**General observations:**
- Having extensive dental surgery in the hospital is traumatizing to the children. I see them back at Head Start after they have had the surgery, and I know how much it can affect them.
As a result of this new program Dr. Mendoza is using, in the last two years I have seen really good improvements reducing the severity of tooth decay in the children attending Head Start.

I now enjoy educating the children that going to the dental clinic is not always associated with getting painful shots!

Sentinel event review to reduce the number of general anesthesia cases; Dee Robertson, MD, MPH (Robertson_Sentinel event review.pdf)

The word ‘sentinel’ represents something that “acts as an indicator of the presence of a problem or danger.” A ‘Sentinel Event Review’ is defined by The Joint Commission as “any unanticipated event in a healthcare setting resulting in serious injury to a patient. Sentinel events are identified... to help aid in root cause analysis and to assist in development of preventive measures.”

In the clinical practice of pediatrics, for decades this has been a standard type of quality assurance or quality improvement process to determine ‘missed opportunities’ for children’s immunizations. Thus, if a child is diagnosed with developing a case of measles, mumps, rubella, diphtheria, tetanus, pertussis, polio, or Haemophilus influenzae type b meningitis, the immediate question is whether the child was appropriately immunized for age. If not, were there any missed opportunities in which the lack of immunizations should have been recognized and action taken. For example:

- Were there any medical clinic visits during the period of interest?
- If so, were the visits for routine Well Child Care or for treatment of acute illness?
- Is there evidence in the medical record that the staff recognized that the child was not properly immunized?
- If so, was the immunization deferred for some reason, and if it was deferred for ‘medical contraindications,’ was the health issue an appropriate reason for deferral?

Using exactly this type of review process has led to IHS-served children having extremely high rates of immunizations, and very low rates of any vaccine-preventable disease.

Restorations and extractions under general anesthesia in young children is a rare event in most groups of children in the U.S. Thus, a ‘sentinel event review’ would be appropriate to learn why the child progressed to such a severe level of disease. Yet in many AI/AN communities treatment under GA is so common that it could almost be called ‘the norm.’ From the presentations given yesterday and today, it’s clear that we now have a safe, effective, feasible and acceptable secondary prevention that can eliminate the need for extensive surgical treatment in a large proportion of AI/AN children. In my opinion, the primary reason this issue has not been addressed in AI/AN communities long ago is the set of false assumptions we as health care providers have had: This is a ‘dental disease’ that needs to be ‘fixed’ by the local dental programs, rather than a health problem that needs to be addressed by the health care system.
Thus, once again we come upon our old friend:

“We have met the enemy, and he is us.”

Viewed in the above context, severe tooth decay in children represents a classic systems failure, and we the public health professionals are the system that is failing. A “missed opportunity” or sentinel event review would identify the exact points of failure. This issue is solvable – even with the chronic resource shortage Indian health care programs experience.

**DAY #2 BREAKOUT SESSIONS**

The concluding session was composed of breakout groups that were tasked with extrapolating the most important ideas and possibilities that had arisen from the prior sessions. The leaders of these groups were specifically instructed to report back to the full participants a prioritized list of realistically actionable items that would help us all set our programmatic agendas for the coming year. Below are the highlights of the recommendations of the groups:

**Group A: What new options have opened up for us based on the Symposium reports?**

- Utilization of SN/SDF as a safe, effective, feasible and acceptable secondary prevention for management of caries in children, trying to reach the children as early as possible and before caries becomes deeply cavitated. There can be a number of delivery models, but expanding this effort beyond the local dental program is essential for maximal success. Other recommended venues are in the pediatric clinic, WIC, and Early Head Start and Head Start.
- We need to develop guidelines for practicing dentists as to what will be the best option for children with common scenarios or presentations of caries in children. This might include the use of Hall Crowns as well as SN/SDF.
- We still have a knowledge gap about the use of GIC sealants in the primary dentition.
- We need to establish whether enamel defects constitute a major risk factor for the early and aggressive caries AI/AN children develop. To do this, we need to have training on correctly identifying and classifying enamel defects.
- We are unlikely to make progress unless we have credible data on (1) what protocols are being used, and (2) the longitudinal outcomes.

**Group B: Data and Metrics**

- In many AI/AN communities, for several decades a remarkable proportion of AI/AN children require restorations and extractions under general anesthesia (GA). Yet we still have no idea of the actual numbers locally, regionally or nationally in IHS and tribally-operated programs. It will be up to a collaboration among the many interested parties at this Symposium if we are to make progress with this relatively straightforward data collection issue.
• While the traditional dmfs/dmft scores remain helpful, to get a complete picture of the excessive morbidity this disease causes AI/AN children, we need to go to other metrics, such as the CIPD caries severity staging system. We should also include non-clinical measures, like quality of life issues and patient satisfaction.
• Now that caries arrest agents such as SN/SDF are being increasingly used, we need a good way for clinical staff to score arrest.
• Data from Early Head Start and Head Start could potentially be a standardized source, but some entity will need to take the lead on this.
• The database currently being used at each of the alpha and beta sites has extensive analytical and reporting capability. Ideally, the input functionalities in this database (treatments, procedures, and outcomes) could be incorporated into the existing IHS electronic dental record system, and the data exported for analysis on other software programs.

Group C: Case selection and protocols
Note: This group largely focused on the issues related to the likely increased utilization of SN/SDF as a secondary prevention that is safe, effective, feasible, and acceptable to parents. There were more questions than answers, but a number of key ‘known unknowns’ were identified:
• For each child the treating dentist needs to establish what the goal is for that child. Is the intent to manage the child ‘definitively,’ or is the intent to keep the child asymptomatic until (a) the tooth exfoliates or (b) a traditional restoration can be performed?
• Should very high risk teeth be treated preemptively, such as newly erupted teeth with fissures and no caries in a child who by history is deemed very high risk?
• How should the clinical decision be made for whether a child is a good candidate for SN/SDF therapy? The size of and number of lesions? What about lesions deemed ‘about to become pulpal?’ When are traditional restorations or alternative restorations such as Hall crowns a better option for the child?
• Regardless of the criteria used for patient selection, we need better documentation of the child’s pre- and post-status. Utilizing pictures would be extremely helpful.
• We will face a choice being trying to stay with a defined number of and frequency of applications of SN/SDF, vs a more flexible approach that is tailored to the status of the child and the capabilities of the family.
• Reimbursement will be a key driver of utilization of SN/SDF. As long as the reimbursement incentives are against it, usage will not be expanded to many children who could benefit from it. In certain situations, IHS facilities are able to bill Medicaid for more than one visit done in the same day if the services are distinct from each other, which could be a substantial incentive for program managers.
Group D: Medical – Dental Collaboration

- The IHS dentists using the Warm Springs Model all report that the two biggest obstacles to more effectiveness in their utilization of SN/SDF is that they lack case finding to identify the children early in the disease process, and lack effective follow-up for many children who are in the protocol. This is a systems issue, and cannot be solved by the dental programs alone. Centralized scheduling should be helpful, if feasible.
- It is likely that the children in many AI/AN communities could receive non-invasive dental services much more efficiently via utilization of community health workers and teledentistry. We need focused attention on how to develop and implement these non-traditional functionalities and delivery models.
- We need to better inform our Indian health care medical colleagues about the importance of oral health to overall health. However, what we first need to do is to design a system in which they can actively participate, but without substantively increasing their already heavy workloads. Limited experience over the last year indicates IHS pediatricians are more open to a medical management of caries model than the dentists working in the same facility.
- Well-designed demonstration programs are the best way to develop credible evidence that the model is safe, effective, feasible, and acceptable to parents.

Dr. Robertson’s Summation

- One of the biggest problems in deciding whether use of SN/FV or SDF or Hall crowns is a ‘better option’ for AI/AN children is that we have essentially zero longitudinal data on the results of ‘conventional treatment.’ Anecdotally, many IHS pediatric dentists report that once caries initiates in a young child, it will almost universally progress, with new lesions often developing before the initial treatment plan can be completed. With cooperation, advocacy and support from the IHS Division of Oral Health, we could get good data on this from an evaluation of comparable sites that have chosen to use the two different approaches – traditional restorations vs the medical management model.

- The reports of ‘collateral benefit’ – mild staining of small parts of the surface of non-treated teeth – by sites using SN/FV is both intriguing and potentially extremely important. It appears that silver ions will migrate and find areas of defective enamel. It is unknown whether the ‘stained’ spots are occurring primarily at sites with a qualitative developmental defect of the enamel, or whether they represent pre-clinical caries, or both. In any case, the presumption must be that these sites are at very high risk for initiation of caries, and that hypothetically the accumulation of Ag+ ions at these sites could have a caries prevention effect. This would seem to be a fertile area for academic research.

This completed the 2016 Symposium on Caries in AI/AN Children.
## APPENDIX A: AGENDA

### Agenda

**QUEST 2016 Symposium on Caries in AI/AN Children**  
**Hood River, Oregon; August 26–27, 2016**

<table>
<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Leader/Presenter</th>
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<tbody>
<tr>
<td>6:45</td>
<td>Breakfast buffet</td>
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<tr>
<td>8:00</td>
<td>Welcome and Introductions; review of Symposium purpose, agenda and expected outcomes</td>
<td>Robertson, Blahut</td>
</tr>
<tr>
<td>8:30</td>
<td>Ethical considerations in our approach to the treatment of dental caries in AI/AN children</td>
<td>Weyant</td>
</tr>
<tr>
<td>8:45</td>
<td>Toward a consequentialist epidemiology that is “centrally about improving health outcomes”</td>
<td>Beltran</td>
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**Group breakout session #1**

<table>
<thead>
<tr>
<th>9:00</th>
<th>Group A: Local dental program directors</th>
<th>Blahut</th>
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<tbody>
<tr>
<td></td>
<td>Group B: Management and administrative staff of organizations represented</td>
<td>Robertson</td>
</tr>
<tr>
<td></td>
<td>Group C: Internal meetings of QUEST Workgroups</td>
<td>Kanellis</td>
</tr>
<tr>
<td></td>
<td>(Epidemiology, Enamel defects, Microbiology, and Interventions)</td>
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<tr>
<td>10:00</td>
<td>Break</td>
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**Group breakout session #2**

<table>
<thead>
<tr>
<th>10:15</th>
<th>Group A: Local dental program directors meet with academic caries researchers</th>
<th>Blahut</th>
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<tbody>
<tr>
<td></td>
<td>Group B: QUEST Directors meet with stakeholder interest groups and organizational representatives</td>
<td>Weyant</td>
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<tr>
<td></td>
<td>Plenary session</td>
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<tr>
<td>1:00</td>
<td>Introduction of afternoon sessions</td>
<td>Robertson</td>
</tr>
<tr>
<td>1:15</td>
<td>QUEST’s activities, accomplishments and plans in Microbiology, Enamel defects and Epidemiology</td>
<td>Schloth &amp; Shi, Fontana &amp; Dabiri, Hennessy, Robertson, Warren</td>
</tr>
<tr>
<td>3:15</td>
<td>Break</td>
<td></td>
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<tr>
<td>3:30</td>
<td>Reports of recent basic and clinical research that inform the use of silver ion products for the treatment of caries in children</td>
<td>Li, Horst, Fontana, Kanellis &amp; Owais</td>
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<tr>
<td>4:45</td>
<td>Identify carry-over issues for day #2</td>
<td>Robinson</td>
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<tr>
<td>5:00</td>
<td>Adjourn</td>
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## Agenda (continued)

### Day #2: Saturday a.m. (plenary)

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<th>Leader/Presenter</th>
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<tbody>
<tr>
<td>6:45</td>
<td>Breakfast buffet</td>
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<tr>
<td>8:00</td>
<td>Summary of key issues from Day #1</td>
<td>Robinson</td>
</tr>
<tr>
<td>8:15</td>
<td>Presentations on experiences and outcome data from utilization of a non-invasive approach to children with caries</td>
<td>IHS, tribal program, and FQHC dental directors</td>
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<tr>
<td>10:00</td>
<td>Break</td>
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<tr>
<td>10:15</td>
<td>Panel discussion: Lessons Learned</td>
<td>Kanellis</td>
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<td></td>
<td>- Which children are the best candidates for a ‘successful’ outcome of a non-invasive model of care?</td>
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<td></td>
<td>- What metrics will be the best measures of ‘success’ for the children, parents, local dentists and local managers?</td>
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<td></td>
<td>- What structural and logistic issues limited or reduced the effectiveness of this model of care at your program?</td>
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<tr>
<td>11:00</td>
<td>Community support for a non-invasive approach to treating caries in AI/AN children</td>
<td>Stabler, Trimble</td>
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<tr>
<td>11:30</td>
<td>A “sentinel event review” approach for reducing the need for children to receive treatment for caries under general anesthesia</td>
<td>Robertson</td>
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### Saturday p.m.

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<tr>
<th>Time</th>
<th>Item</th>
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<tbody>
<tr>
<td>Noon</td>
<td>Catered lunch for Symposium participants: informal discussions</td>
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<tr>
<td>Group breakout session #3</td>
<td>Breakout groups discuss the implications of the prior sessions for addressing systems issues and making policy:*</td>
<td>Blahut, Kanellis, Robinson, Robertson, Weyant</td>
</tr>
<tr>
<td></td>
<td>- What new options have opened up for us?</td>
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<tr>
<td></td>
<td>- Are the reported experiences and data sufficiently compelling to justify new programmatic efforts?</td>
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<td>- What models for new approaches are most promising?</td>
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<td>- What collaborations will be needed to fund, develop and implement demonstration projects?</td>
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<td>- To measure the success of any new approach, what metrics will have the most utility for caries in AI/AN children?</td>
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<td>* Note: these topics may be modified based on the issues and questions raised in the prior sessions.</td>
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<tr>
<td>2:30</td>
<td>Reports from breakout sessions</td>
<td>Robertson</td>
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<td>3:00</td>
<td>Adjourn</td>
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## APPENDIX B: PARTICIPANTS

<table>
<thead>
<tr>
<th>Participants</th>
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<tbody>
<tr>
<td>Joan Attridge, DDS</td>
</tr>
<tr>
<td>Lorie Becker, RDH, MS</td>
</tr>
<tr>
<td>Eugenio Beltran, DMD, MS, DrPH</td>
</tr>
<tr>
<td>Patrick Blahut, DDS, MPH</td>
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<tr>
<td>Moffett Burgess, PhD, DDS</td>
</tr>
<tr>
<td>Joseph Churchill, DDS</td>
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<tr>
<td>Samantha Clark, DDS</td>
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<tr>
<td>David Drockton, DDS</td>
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<tr>
<td>Fred Eichmiller, DDS</td>
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<tr>
<td>Amanda Engelhardt, DDS</td>
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<tr>
<td>Margherita Fontana, DDS, PhD</td>
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<tr>
<td>Steve Geiermann, DDS</td>
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<tr>
<td>Laura Hammitt, MD</td>
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<tr>
<td>Cindy Hannon, MSW</td>
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<tr>
<td>Tom Hennessy, MD, MPH</td>
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<tr>
<td>Steve Holve, MD</td>
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<tr>
<td>Jeremy Horst, DDS, PhD</td>
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<td>Kim Hort, DMD</td>
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### Participants (continued)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Dan Huber, DMD</td>
<td>Area Dental Officer, Phoenix Area IHS, Phoenix, AZ</td>
</tr>
<tr>
<td>Mary Beth Johnson, DDS, MPH</td>
<td>Pediatric Dentist, Hopi Health Center, Hopi, AZ</td>
</tr>
<tr>
<td>Mike Kanellis, DDS, MS</td>
<td>Associate Dean, Pediatric Dentistry, University of Iowa</td>
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<tr>
<td>Laura Larsson, PhD, MPH, RN</td>
<td>Associate Professor, College of Nursing, Montana State University, Bozeman, MT</td>
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<td>Yihong Li, DDS, MPH, DrPH</td>
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<td>Don Marianos, DDS, MPH</td>
<td>Private Consultant, Dental Public Health, Pinetop, AZ</td>
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<tr>
<td>Frank Mendoza, DDS</td>
<td>Pediatric Dentist, IHS Dental Clinic, Warm Springs, OR</td>
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<tr>
<td>Mike Monopoli, DMD, MPH, MS</td>
<td>Director of Policy &amp; Programs, DentaQuest Foundation, Boston, MA</td>
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<tr>
<td>Nathan Mork, DDS, MPH</td>
<td>Area Dental Field Consultant, IHS Bemidji Area, White Earth, MN</td>
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<tr>
<td>Gary Nelson, DDS</td>
<td>Professor, Pediatric Dentistry, OHSU, Portland, Oregon</td>
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<tr>
<td>Laurie Norris, BS, MA, MS, JD</td>
<td>Senior Policy Advisor, Center for Medicare &amp; Medicaid Services, Washington, DC</td>
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<tr>
<td>Arwa Owais, BDS, MS</td>
<td>Associate Professor, Univ. of Iowa College of Dentistry, Iowa City, IA</td>
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<tr>
<td>Gary Pannabecker, DDS</td>
<td>Dental Director, Blackfeet IHS Dental Clinic, Browning, MT</td>
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<tr>
<td>Kathy Phipps, DrPH</td>
<td>Oral Epidemiologist, Private Consultant, Morro Bay, CA</td>
</tr>
<tr>
<td>Nadia Prokofieva</td>
<td>Program Manager, DentaQuest, Westborough, MA</td>
</tr>
<tr>
<td>Dee Roberson, MD, MPH</td>
<td>President of QUEST, Consultant in Pediatric Health Research</td>
</tr>
<tr>
<td>Lindsey Robinson, DDS</td>
<td>ADA 13th District Trustee, Pediatric Dentist, Private Dental Clinic, Grass Valley, CA</td>
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<tr>
<td>Miles Rudd, MD</td>
<td>Chief Medical Officer, Portland Area IHS, Portland, OR</td>
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<tr>
<td>Kim Russell</td>
<td>Executive Director, Arizona, Advisory Council on AI Health, Phoenix, AZ</td>
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<tr>
<td>Bob Schroth, DMD, MSc, PhD</td>
<td>Professor of Dentistry, University of Manitoba, Winnipeg, Manitoba</td>
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<tr>
<td>Wenyuan Shi, PhD</td>
<td>Chairman, Oral Biology, UCLA School of Dentistry, Los Angeles, CA</td>
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<tr>
<td>Juanita Simpson, RDH</td>
<td>Hygienist, Warm Springs IHS Dental Program, Warm Springs, OR</td>
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<tr>
<td>Lori Snidow, DDS</td>
<td>Director, Dental Outreach, IHS Dental Clinic, Cass Lake, MN</td>
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## Participants (continued)

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Institution</th>
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<tbody>
<tr>
<td>Andrew Soderstrom, DDS</td>
<td>Private Pediatric Dentist, Modesto, CA</td>
</tr>
<tr>
<td>Crystal Spring, RDH</td>
<td>Hygienist, Fort Peck Tribal Health, Poplar, MT</td>
</tr>
<tr>
<td>Wehnona Stabler, MPH</td>
<td>CEO, Carl T. Curtis Health Center, Macy, NB</td>
</tr>
<tr>
<td>John Warren, DDS</td>
<td>Professor of Dentistry, College of Dentistry, University of Iowa</td>
</tr>
<tr>
<td>Bob Weyant, DMD, DrPH</td>
<td>Chair, Dept. Dental Public Health, School of Dental Medicine, Univ. of Pittsburg</td>
</tr>
<tr>
<td>Tim Wright, DDS</td>
<td>Chair, Department of Pediatric Dentistry, School of Dentistry, UNC, Chapel Hill, NC</td>
</tr>
<tr>
<td>John Zimmer, DDS</td>
<td>Pediatric Dentist, IHS, W.W. Keeble Center, Sisseton, SD</td>
</tr>
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