Interprofessional Management of Dental Caries in Children

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Agenda

• Prevalence of dental caries in children
• Inter-professional needs
• Dental caries lesion development
• Identification of children at high caries risk
• Basics of caries detection
• Essentials of dental caries prevention and management for the Healthcare Team
Disclosure

I do not have a relevant financial relationship with a commercial interest associated with this presentation (i.e., no specific commercial product brands, etc. described in presentation)

I currently have or recently had research grants from NIH, ADA, and most oral hygiene product manufacturers (Chattem, Colgate-Palmolive, Dentsply, Gaba, GlaxoSmithKline, Johnson & Johnson, 3M, Philips, Premier USA, Procter & Gamble, Ultradent, Unilever, Wrigley, etc.)
US Prevalence of Dental Caries in Primary Teeth (2011-12): Aged 2-8

Dye et al., 2015
CDC
US Prevalence of Dental Caries in Permanent Teeth (2011-12): Aged 6-11

### Dental caries experience

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>6–8 years</th>
<th>9–11 years</th>
<th>Non-Hispanic white</th>
<th>Non-Hispanic black</th>
<th>Hispanic</th>
<th>Non-Hispanic Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>21.3</td>
<td>13.8</td>
<td>28.8</td>
<td>18.5</td>
<td>23.1</td>
<td>27.1</td>
<td>17.7</td>
</tr>
</tbody>
</table>

### Untreated dental caries

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>6–8 years</th>
<th>9–11 years</th>
<th>Non-Hispanic white</th>
<th>Non-Hispanic black</th>
<th>Hispanic</th>
<th>Non-Hispanic Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5.6</td>
<td>3.3</td>
<td>7.9</td>
<td>4.0</td>
<td>7.1</td>
<td>8.8</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Note: Data from Dye et al., 2015.

Dye et al., 2015
Michigan: 3rd grade children % with Caries Experience

- S. Lower Peninsula
- Suburban Detroit
- City of Detroit
- N. Lower Peninsula
- Upper Peninsula

Not Enrolled  Enrolled free/reduced lunch program

Michigan: 3rd grade children % with untreated Dental Disease

- S. Lower Peninsula
- Suburban Detroit
- City of Detroit
- N. Lower Peninsula
- Upper Peninsula

- Not Enrolled
- Enrolled free/reduced lunch program

Children’s Oral Health in Michigan

It is **preventable**, yet is the **most prevalent** chronic condition among children

**The Need**

- 1 in 7 elementary school children had a toothache in the last 6 mo.
- More than 1 in 4 Michigan 3rd graders has untreated dental disease
- 80% of cavities are found in 20% of the population.
The Primary Dentition

- Functional and esthetic functions (chewing, speaking, smiling, etc.)

- Important role in alignment, spacing and occlusion of permanent teeth
Children’s Oral Health in Michigan

The Need

- 1 in 7 elementary school children had a toothache in the last 6 mo.
- 80% of cavities are found in 20% of the population.
- More than 1 in 4 Michigan 3rd graders has untreated dental disease.

The Challenges

- Dental Capacity
- Technology
- Pediatric Practice Barriers
- Politics
- Misunderstood/Undervalued Problem
Need for Interprofessional Care

First year of life

• Only 1.5% has had a dental appointment

• Most children do not receive a dental examination, nor do the parents receive education on oral health (Edelstein et al., 2000)

• 89% have been examined by a physician

• High risk children have greater access to medical than to dental care, involving multiple well-child visits in the early years of life
Need for Interprofessional Care

Models of oral health care involving expanded partnerships with the medical community are a necessary strategy for reducing disparities in caries in children (e.g., Smiles for Life, etc.)

Preventive services in medical settings results in reduced caries experience (Kranz et al., 2015)

![Graph showing predicted number of DMFS (decayed, missing, filled surfaces) for different numbers of visits.](image)
- The setting/provider type does not influence the effectiveness of preventive services on children's caries experience (Kranz et al., 2014)
You can help reduce dental caries epidemic by:

1. Screening and assessing risk for caries
2. Preventing through
   - Promoting Brushing with F toothpaste 2x/day
   - Applying Fluoride Varnish in office at every well child visit
   - Providing Diet counseling
3. Referring when needed
   - Helping establish a Dental Home
Supersaturation

\[
\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2
\]

Saliva

Plaque

Sucrose

\[
\begin{align*}
\text{Ca}^{2+} & \quad \text{OH}^- \\
\text{PO}_4^- & \quad \text{OH}^- \\
\text{Ca}^{2+} & \quad \text{Ca}^{2+} \\
\text{PO}_4^- & \quad \text{PO}_4^- \\
\text{H}^+ & \quad \text{H}^+ \\
\text{H}_2\text{PO}_4^- & \quad \text{H}_2\text{PO}_4^- \\
\text{PO}_4^- & \quad \text{PO}_4^- \\
\text{H}_3\text{PO}_4 & \quad \text{H}_3\text{PO}_4 \\
\end{align*}
\]

Calculus

Plaque
Enamel Surface Dynamics

Bacteria + Substrate

Acids

Unsaturation

Mineral Gain

Supersaturation

Mineral Loss

Ca PO₄ F

Buffers

Saliva
What is Early Childhood Caries (ECC)?

Early Childhood Caries is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a preschool-age child <6 years of age) (ADA).

Prevalence
~23% Age: 2–5 years
~37% Age: 2–8 years
35% of 3-year-olds from low income families
<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>% $d_3mfs&gt;0$ (d$_3mfs$)</th>
<th>Odds Ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-H White</td>
<td>11% (0.7±3.3)</td>
<td></td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Non-H Black</td>
<td>37% (3.8±10.7)</td>
<td>2.6 (B&gt;W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.6 (B&gt;Multi)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-H Other</td>
<td>33% (4.8±10.5)</td>
<td>4.2 (Other&gt;W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-H Multi-race</td>
<td>22% (2.3±6.8)</td>
<td>1.6 (Multi&gt;W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>35% (5.0±11.4)</td>
<td>2.7 (H&gt;W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.7 (H&gt;Multi)</td>
<td></td>
</tr>
<tr>
<td><strong>Medicaid Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicaid</td>
<td>33% (3.8±10.2)</td>
<td>2.1 (M&gt;No M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Medicaid</td>
<td>12% (0.8±3.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>22% (2.2±7.2)</td>
<td>1.5 (M&gt;F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>27% (2.8±9.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fontana et al., 2017
Distribution of Caries Experience
% cavitated surfaces overtime

Age 2.5

Age 4
Risk factors for ECC
Diet

It’s not just WHAT, but HOW children eat

Frequency
If sugars/carbohydrates are consumed frequently, there is insufficient time for the remineralization process to occur.
• Feeding/Drinking on demand…NO!!!!
• Be aware of sippy cups!!!! (only water)
• Do not put a child to sleep with anything in the bottle other than water if teeth are present!

Smiles for Life
Socio-Demographic Factors

Children living in low socio-economic status families/high deprivation areas have significantly more caries than those from high socio-economic areas.
Space Between Teeth

40% caries experience if 3 or greater tight contacts vs. 26% if all contacts are open
  – OR 2.07

Caries in Maxillary Central Incisors: 12% if no spacing versus 5% if normal
  – OR 2.65
**Enamel Defects** are disturbances in the process of apposition and mineralization of dental enamel and may be manifested as enamel hypoplasias (in which there is true loss of tooth structure) “or opacities.”

**Tethered/Constricted Tongue**
43% vs 24% with Caries - OR 2.12
Medical Factors: Low Saliva Flow

• Low salivary flow rate - associated with caries increase
• Rare in children
Maternal risk factors and caries in their children

• Maternal weight and intake of sugar and fat in pregnancy were associated with caries experience in preschool children (Wigen et al., 2011)

• Mothers’ oral health status was a strong predictor of the oral health status of their children, with a similar relationship observed between mothers’ tooth loss and caries experience among their children (Dye et al., 2011)
Statistically Significant Variables (p<0.001) | Odds Ratio
---|---
Race/Ethnicity: | 
Child Hispanic | 4.8 |  
Child Non-H Black | 4.8 |  
Child Non-H Multirace or Other | 2.9 |  
Child going to sleep daily while nursing or drinking something other than water | 2.9 for each 1 level difference (weekly, monthly, never) |  
Child drinks sugary drinks such as regular soda, sweet tea, chocolate milk, strawberry milk or fruit juice between meals 3 or more times a day | 3.2 for each 1 level difference (1-2 times a day, weekly, monthly, never) |  
Child eats sugary snacks such as raisins, candy, cookies, cakes or cereal between meals 3 or more times a day | 1.2 for each 1 level difference (1-2 times a day, weekly, monthly, never) |  
PCG cleaning the pacifier by putting it in their mouth weekly-monthly vs. not | 2.5 |  
PCG sharing/tasting food daily with child using same spoon/fork/glass weekly vs. never | 1.4 |  
PCG’s gums bleeding daily when brushing vs. weekly/monthly or never | 4.0-5.4 |  
PCG has had cavities/fillings/extractions in last 2 years vs. no | 2.4 |  
PCG states they do poor/fair job taking care of the child's teeth and/or gums (past behavior) vs. excellent | 2.1 |  
PCG never gets dental check-ups vs. yearly or every other year | 2.2-3.4 |  

Preliminary model (n=982); questionnaire responses to predict caries \([d_3\text{mfs}; d>\text{ICDAS 3}]\) by age 4; c-statistic (area under the ROC curve)=0.83
Health Care Providers

• Screen and assess risk for caries
How to recognize caries lesions? Stages

Knee-to-knee exam

Healthy-Sound (F prevent caries)

Non-Cavitated Caries Lesion (brown or white) (F can arrest caries and prevent future ones)

Cavitated Caries Lesion (REFER; F can help prevent new lesions)
Silver Diamine Fluoride
Caries Experience

Positive strong correlation between caries experience and future caries development

Children with previous caries experience are at increased risk of future caries
Health Care Providers

• Screen and assess risk for caries
• Prevent through
  – Promoting Brushing with F toothpaste 2x/day
  – Application of Fluoride Varnish in office at every well child visit
Fluoride Exposure
# Fluoride Use Recommendations

## Summary of Fluoride Modalities for Low- and High-Risk Patients

<table>
<thead>
<tr>
<th>Fluoride Modality</th>
<th>Low Caries Risk</th>
<th>High Caries Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toothpaste</td>
<td>Starting at tooth emergence</td>
<td>Starting at tooth emergence</td>
</tr>
<tr>
<td>Fluoride varnish</td>
<td>Every 3-6 months starting at tooth emergence</td>
<td>Every 3-6 months starting at tooth emergence</td>
</tr>
<tr>
<td>Over-the-counter mouth rinse</td>
<td>Not applicable</td>
<td>Starting at age 6 if the child can reliably swish and spit</td>
</tr>
<tr>
<td>Community water fluoridation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dietary fluoride supplements</td>
<td>Yes, if drinking water supply is not fluoridated</td>
<td>Yes, if drinking water supply is not fluoridated</td>
</tr>
</tbody>
</table>

**New USPSTF recommendations for pediatricians:**
Apply fluoride varnish to the primary teeth of all infants and children starting at the age of primary tooth eruption (B recommendation)

Moyer, Pediatrics 2014
Toothbrushing and Toothpaste Guidelines

• Brush twice daily- as soon as teeth emerge
  – *Bedtime is the most critical time*

• Caregiver should brush child's teeth
  – Children learn to expectorate well between age 3 and 5 years
  – Difficulty brushing all areas
  – Intermittent supervision after 5

• Spit out, limited or not rinse, after brushing if risk is high

F Toothpaste: All 2x/day
Fluoride Varnish in Non Dental Settings

Standard of Care

• The United States Preventive Services Taskforce (USPSTF) in 2014 recommended that primary care clinicians apply fluoride varnish to the teeth of all infants and children, starting with the appearance of the first primary tooth through age 5, at least every 6 months.
• All children should receive a professional fluoride treatment at least every 6 months in the primary care medical home.
• Higher risk children should receive fluoride varnish application every 3 months.
Fluorosis

Appearance and Significance

- White mottling of teeth due to chronic excessive exposure to fluoride during tooth development (before it erupts!; 1-3 years of age for front permanent teeth)
- Mostly cosmetic

Risk Reduction

- Determine fluoride content of drinking water before prescribing F supplements
- Avoid duplicating fluoride prescriptions
- Advise appropriate amount of fluoride toothpaste use by age-Supervision!
- **Fluoride varnish is not a risk factor for fluorosis**
Health Care Providers

• Screen and assess risk for caries
• Prevent through
  – Promoting Brushing with F toothpaste 2x/day
  – Application of Fluoride Varnish in office at every well child visit
  – Providing Dietary counseling
Fruit Juice in Infants, Children, and Adolescents: Current Recommendations

Melvin B. Hayman, MD, FAAP, Steven A. Abrams, MD, FAAP, SECTION ON GASTROENTEROLOGY, HEPATOLOGY, AND NUTRITION, COMMITTEE ON NUTRITION

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN

How Much Juice Should Children Drink? The American Academy of Pediatrics Guidelines
Health Care Providers

• Screen and assess risk for caries

• Prevent through
  – Promoting Brushing with F toothpaste 2x/day
  – Application of Fluoride Varnish in office at every well child visit
  – Providing Dietary counseling

• Refer when needed
  – Help establish a Dental Home
Health Care Provider
• **MiDR<sup>S</sup>M**: communication and transparency between medical and dental providers, better coordination / continuity of patient care

• Classified by CMS as a Meaningful Use Specialized Registry

• **MiDR<sup>S</sup>M**: information on a child's access to and utilization of preventive oral health services in both the medical and dental environments= reportable data system for monitoring pediatric oral health access to services, and overall dental caries rates
MCPP: Michigan Caries Prevention Program (Started third quarter 2015): Rates of screenings and FV in medical settings increased as a result

FV claims data (blue from dental settings, orange from medical settings): Increase in FV in medical settings as a result of MCPP is not at the expense of those in dental settings

Preliminary Data: Altarum Institute
Important Points to Remember from the lecture

Dental Caries - Most prevalent disease in children

Interprofessional care is essential

- Identify children at risk
- Help establish good home habits regarding diet and fluoride toothpaste usage
- Apply fluoride varnish
- Refer when needed
FQHC reimbursement will vary based on existing contracts with Medicaid Health Plans

**Fluoride Varnish Application:** Fluoride varnish application of children up to age 3 (0-35 months)
- Can be billed up to **four times a year**
- CPT Code: 99188; $9.00
- Diagnosis code: Z00.129

**Oral Screening:** Screening of children up to age 3 (0-35 months). Counseling with the primary caregiver and referral (as needed) is required. The [AAP Risk Assessment](https://www.aapd.org/modern-healthcare/) is recommended to help the provider identify patient risk.
- Can be billed up to **two times a year**.
- CDT Code: D0190; $14.89
- Diagnosis code: Z00.129

*Private insurance coverage varies, you will need to verify coverage with individual health plans.*

**Depending on the insurance carrier, adding a Modifier 33 is recommended if a rejection is received.*