A field investigation of dental caries in rural Alaska Native children

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Disclosures

- Dr Foote has no relevant financial relationships with the manufacturer(s) of commercial services discussed in this CME activity.
- Dr Foote does not intend to discuss any unapproved/investigational uses of commercial products in this presentation.
- The findings and conclusions in this presentation do not necessarily represent the official position of CDC.
The Problem

- CDC Arctic Investigations Program was informed of high rates of childhood caries and full mouth reconstructions in children under 6 years of age in the YK Delta, AK

- 400 procedures in 2007

- Annual births ~ 600
Investigation Objectives

- Describe dental caries prevalence in rural SW Alaska
- Determine risk factors for dental caries
- Determine how parental attitudes and behaviors affect rates of childhood caries, toothbrushing and soda consumption
Study Population

- **Rural SW Alaska**
  - Population 25,000, 50 villages, 85% Yupik Eskimo

- **Convenience sample of 5 villages**
  - Population of the villages between 350-6,000
  - 3 villages majority of households have running water
  - 2 villages with fluoridated drinking water
  - 4 villages residents fly/boat to doctor/dentist

- **Conducted at village schools**
  - All children 4 – 15 years of age invited to participate
# Participant Demographics

<table>
<thead>
<tr>
<th>Total, N=355</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
</tr>
<tr>
<td>4 - 5</td>
<td>12</td>
</tr>
<tr>
<td>6 - 11</td>
<td>58</td>
</tr>
<tr>
<td>12 - 15</td>
<td>28</td>
</tr>
<tr>
<td>AI/AN</td>
<td>100</td>
</tr>
<tr>
<td>Male Sex</td>
<td>52</td>
</tr>
<tr>
<td>Running Water in Home</td>
<td>49</td>
</tr>
<tr>
<td>Fluoridated Water</td>
<td>33</td>
</tr>
<tr>
<td>Dental Visit in Last Year</td>
<td>45</td>
</tr>
<tr>
<td>Child 2x daily toothbrushing</td>
<td>38</td>
</tr>
<tr>
<td>Parent 2x daily toothbrushing</td>
<td>39</td>
</tr>
<tr>
<td>2 or more sodas per day</td>
<td>26</td>
</tr>
</tbody>
</table>
Average number of dental caries in primary teeth by age group, YK Delta and total United States

![Graph showing the average number of dental caries in primary teeth by age group for YK Delta and total United States. The graph compares the average number of decayed, filled, and extracted teeth (dft) for age groups 4-5 and 6-11 years. For the 4-5 age group, the average number of dft is 1.6 for YK Delta and 7.3 for total United States, which is 5 times higher. For the 6-11 age group, the average number of dft is 1.8 for YK Delta and 4.1 for total United States, which is 2 times higher.]
Average number of dental caries in permanent teeth by age group, YK Delta and general United States

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>YK Delta</th>
<th>Total U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 - 11</td>
<td>1.7</td>
<td>0.5</td>
</tr>
<tr>
<td>12 - 15</td>
<td>5.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

3x
### Risk factors for dental caries

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Primary teeth</th>
<th>Permanent teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dft</td>
<td>DMFT</td>
</tr>
<tr>
<td>Lack of water fluoridation</td>
<td>200% (3x)</td>
<td>70%</td>
</tr>
<tr>
<td>Increased soda-pop consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 soda / day</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1 soda / day</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>2 soda / day</td>
<td>30%</td>
<td>60%</td>
</tr>
<tr>
<td>≥3 sodas / day</td>
<td>50%</td>
<td>100% (2x)</td>
</tr>
</tbody>
</table>
Parental behaviors impact dental health

- Self-efficacy – ability to overcome barriers to perform a particular behavior
- Fatalism – belief that most children develop caries regardless of behavior
- Knowledge of dental hygiene
Parental behaviors impact dental health

- **Adair et al 2004**
  - Parents with high self-efficacy are more likely to have children that brush their teeth 2 times daily and consume less sugar

- **Finlayson et al 2007**
  - Maternal fatalism associated with early childhood caries
  - Knowledge of dental hygiene protective
Motivational Interviewing and Dental Caries

Harrison (2007)- motivational interviewing (MI) vs. traditional health education for mothers of infants 6-18 months.

- MI group developed less caries 2 years after intervention. HR 0.54
- Higher rates of fluoride varnish applications than control 3.8 vs 0.3
Behavioral predictors for twice daily toothbrushing

Child
- Parental 2x/daily toothbrushing
  - OR 3.4 p<0.01
- High parental self-efficacy
  - OR 2.6, p=0.02
- High parental dental knowledge
  - OR 2.6 p=0.01

Parent
- Running water in home
  - OR 2.9 p <0.01
- High self-efficacy
  - OR 2.4 p<0.01
Behavioral predictors of severe childhood caries and high soda consumption

- Severe childhood caries
  - High parental fatalism OR 1.44, p=0.02
    - Parents were more likely (OR 2.0) to have high fatalism if they did not have running water in their home

- 2 or more cans of soda consumed per day
  - High parental fatalism OR 1.8, p=0.03
  - High parental self-efficacy protective OR 0.14, p<0.01
Conclusions

- High rates of childhood caries and soda consumption
- Lack of water fluoridation and high soda consumption strongly associated with dental caries
- Parental attitudes and behaviors are associated with toothbrushing, soda consumption, and childhood caries
- Presence of running water associated with increased parental toothbrushing and decreased parental fatalistic beliefs regarding childhood caries
Future Directions

- Support water fluoridation in Alaska communities
- Support efforts to increase water supply in homes
- Develop motivational interviewing interventions to improve parental self-efficacy, and encourage toothbrushing, fluoride varnish applications, and decrease soda consumption
The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention (CDC) and should not be construed to represent any CDC determination or policy.
Parental Attitudes

- **Self Efficacy**
  - How sure are you that your child will brush (his/her) teeth at least once a day when?
    - You are under a lot of stress.
    - You are feeling down.
    - You are too busy.
    - You are tired.
    - Your child doesn’t behave when you want them to brush
    - You have to frequently remind child to brush

- **Fatalism**
  - Most children eventually develop dental cavities.
  - Cavities in baby teeth don’t matter since they fall out anyway.
  - No matter what I do my child will develop dental cavities.

- **Knowledge**
  - It’s ok to put a baby to bed with a bottle
  - Problems with baby teeth can affect adult teeth.
  - Tooth decay (rotten teeth) could affect a child's overall health.
  - Soda / pop is bad for teeth.
  - Bottle-feeding after a child is 1-year-old is bad for his/her teeth.