EARLY CHILDHOOD CARIES & FLUORIDE VARNISH

FLUORIDE VARNISH MINI-SYMPOSIUM
MAY 16, 2008
TOPEKA, KS

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MAKING ORAL HEALTH A PRIORITY IN KANSAS

BECAUSE IT MATTERS
THE EMPHASIS HAS TO BE ON
THE YOUNG CHILD
WHY THIS EMPHASIS ON THE YOUNG CHILD?

MOST OF US ‘OLD’ “PEDODONTISTS” HAVE SEEN A RAISE IN THE CAVITY RATE. DESPITE PAST REPORTS TO THE CONTRARY, THE CAVITY RATE “HAS BEEN INCREASING…..” THE CDC RECENTLY AGREED
**RECENT CENTER FOR DISEASE CONTROL (CDC) REPORT**

- **(April 2007)**

  - Oral Health Improving for Most Americans, But **Tooth Decay Among Preschool Children on the Rise**
  - Americans of all ages continue to experience improvements in their oral health. However, tooth decay in primary (baby) teeth increased among children aged 2 to 5 years, according to a report released by the Centers for Disease Control and Prevention (CDC).
  - Based on data from CDC's National Center for Health Statistics, the report, "Trends in Oral Health Status-United States, 1988-1994 and 1999-2004," it represents the most comprehensive assessment of oral health data available for the U.S. population to date. *(THIS IS OLD DATA)*
WHY THIS EMPHASIS ON THE YOUNG CHILD?

• “CARIES PREVALENCE GOES UP MOST BETWEEN 1 → 2 YEARS OF AGE”
• “HOW BIG OF A DISEASE IS DENTAL CARIES? ANS: $50 BILLION”

» JOEL BERG, U WASH, 2007
SO, AGAIN...WHY THIS EMPHASIS ON... THE YOUNG CHILD?

• ONCE YOU GOT THE DISEASE, YOU GOT THE DISEASE, SO IT’S ONLY LOGICAL THAT.....

• IT IS EASIER AND CHEAPER TO PREVENT THE DISEASE THAN TREAT THE DISEASE

• ORAL HEALTH IMPACTS WHOLE BODY HEALTH
WHY– THIS EMPHASIS ON THE YOUNG CHILD?

• IT IS THE MORAL DUTY OF A DEVELOPED SOCIETY TO TAKE CARE OF THEIR CHILDREN’S (ORAL) HEALTH CARE NEEDS. THE CHILD CANNOT DO THIS FOR THEMSELVES.
CURRENT SCIENCE

• BRIEF OVERVIEW
CORRECT CURRENT TERMINOLOGY

• CARIES IN INFANTS AND TODDLERS =

• E C C (EARLY CHILDHOOD CARIES)
‘CARIES IS A BIOFILM-MEDIATED, ACID DEMINERALIZATION OF ENAMEL (AND DENTIN)’

AAPD
Caries are produced from the dynamic interaction of 3 variables:

- Caries-causing bacteria
- Fermentable carbohydrates
- Teeth

...and...

AAPD
THE SCIENCE OF CARIES

• THIS DYNAMIC PROCESS INVOLVES:
  – BACTERIAL INFECTION AND TRANSMISSION
  – SUSCEPTABILITY TO ACQUIRE THE INFECTION
  – HYGIENE HABITS
  – FLUORIDE EXPOSURE
  – DIETARY HABITS
  – FAMILY HISTORY AND DYNAMICS
    – SOCIAL, CULTURAL AND BEHAVIORAL FACTORS
    – SOCIOECONOMIC FACTOR
THE SCIENCE

CARIES IS AN INFECTIOUS DISEASE

CARIES IS A MULTIFACTORIAL DISEASE
(RESULTING IN DEMINERALIZATION AND REMINERALIZATION)

CARIES IS A PREVENTABLE DISEASE
CARIES IS AN **INFECTIOUS** DISEASE

- A CHILD IS NOT BORN WITH CAVITY CAUSING BACTERIA IN THEIR MOUTH
- SO...
  - FROM WHAT?
  - FROM WHOM?
  - HOW?

...DO THEY GET IT?
Caries is an **infectious** disease

*Strep Mutans – Primary bacteria*

Strep Salavarious – Very potent. May be the primary culprit in the child with the most severe, recurring cavities

Lactobacillus

7/8 Others - S. Sobrinus

72% of the time, the bacteria is acquired from the mother
TOOTH ENAMEL

• ENAMEL IS A PERMEABLE STRUCTURE COMPOSED OF AN ORGANIC MATRIX AND INORGANIC FILLER MATERIAL MADE OF HYDROXYAPETITE CRYSTALS

• ENAMEL’S PERMEABILITY ALLOWS FOR EXCHANGE OF CALCIUM, PHOSPHATE AND FLUORIDE IONS

• PH IS CRITICAL IN MAINTAINING SOUND ENAMEL

• WHEN PH IS ALTERED, DEMINERALIZATION OR REMINERALIZATION WILL OCCUR

• ACIDIC PH ALLOWS LEACHING OUT OF THE CALCIUM AND PHOSPHATE MOLECULES AND A BREAKDOWN OF THE CRYSTALS
THE SCIENCE
DEMINERALIZATION AND REMINERALIZATION

• COLONIZATION BY BACTERIA
• BACTERIA METABOLIZE FERMENTABLE CARBOHYDRATES VIA SALIVARY AMYLASE
• BACTERIA EXCRETE ACID AS A BY-PRODUCT OF METABOLISM
• ACID CONTACT CAUSES DEMINERALIZATION OF THE SURFACE AND SUBSURFACE ENAMEL
BACTERIA EXCRETE ACIDS

• WITHIN 5 MINUTES OF INGESTION AS THE SUGARS AND STARCHES ARE DIGESTED
• ACIDS PERSIST FOR 20-40 MINUTES
• SALIVA BUFFERS THE ACID...TO A POINT
• FLUORIDE, PHOSPHATE AND CALCIUM MOLECULES HELP REMINERALIZE EFFECTED ENAMEL
seemingly intact surface layer

diffusion channels in enamel

partially demineralized sub surface

bacteria

F⁻, Ca⁺⁺, PO₄³⁻
Partially Demineralized Enamel Crystals

- Acid diffusion through rod substance
- Calcium and phosphate dissociate
FREQUENCY

• A KEY – THE FREQUENCY OF THE ACID PRODUCTION, THEREFORE, THE FREQUENCY OF THE EXPOSURE TO FERMENTABLE CARBOHYDRATES

• ONE OF THE MOST IMPORTANT KEYS

• SO, KIDS WHO SNACK OR SIP ALL DAY ......
ACID ATTACK

Regular Meals (M)

Regular Meals (M)
plus
Sweet Snacks (S)
THE SCIENCE

• CARIES IS PREVENTABLE…
FLUORIDE MECHANISMS

• SYSTEMIC

• TOPICAL
SYSTEMIC FLUORIDE

– FLUORIDE THAT IS INGESTED. IT IS INCORPORATED INTO THE HYDROXYAPATITE CRYSTAL AND MAKES THE ENAMEL LESS SOLUBLE TO ACID DISSOLUTION

– 1. WATER FLUORIDATION

– 2. LIQUID OR PILL SUPPLEMENTATION (OR, FLUORIDE THAT IS NOT SUPPOSED TO BE SWALLOWED, LIKE IN TOOTHPASTE)
Systemic Fluoride Considerations

MANY MUNICIPAL WATER SYSTEMS ARE FLUORIDATED......WICHITA’S WATER IS NOT FLUORIDATED (1 OF THE LARGEST CITIES IN THE U.S. WITHOUT FLUORIDE)

MANY WATER FILTERS REMOVE FLUORIDE
HOW DO YOU KNOW?

BOTTLED WATER USUALLY DOES NOT HAVE FLUORIDE (26% OF PEOPLE DRINK ONLY BOTTLED WATER)
Systemic Fluoride Considerations

** FLUORIDE THAT IS INGESTED ALSO IS CONTINUALLY RELEASED INTO THE SALIVA IN MINUTE AMOUNTS**

**THIS IS A SIGNIFICANT CAVITY DETERRENT.**
Halo Effect

BEWARE OF THE “HALO EFFECT”

• MULTIPLE SOURCES OF FLUORIDE INCREASE THE DANGER OF FLUOROSIS
• INGESTION OF TOO MUCH FLUORIDE IN TOTAL FROM:
  – WATER
  – TOOTHPASTE
  – PREPACKAGED BEVERAGES
  – SUPPLEMENTS
  – RINSES, GELS, VARNISHES

• WHEN, AND IF, I WRITE AN RX......I GENERALLY USE ½ THE RECOMMENDED DOSE
<table>
<thead>
<tr>
<th>Age of Child</th>
<th>Water Fluoride Concentration (parts per million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 0.3</td>
</tr>
<tr>
<td>Birth to 6 Months</td>
<td>0</td>
</tr>
<tr>
<td>6 months to 3 years</td>
<td>0.25 mg liquid drops</td>
</tr>
<tr>
<td>3 to 6 years</td>
<td>0.5 mg drops or tablet</td>
</tr>
<tr>
<td>6 to 16 years</td>
<td>1.00 mg</td>
</tr>
</tbody>
</table>
SHOULD SYSTEMIC FLUORIDE BE PRESCRIBED ANY MORE?

• BE CAREFUL
TOPICAL FLUORIDE

• FLUORIDE THAT IS USED TOPICALLY (BRUSHED, RINSED OR PAINTED ON).

• IT IS INCORPORATED INTO THE VERY OUTER LAYERS OF THE ENAMEL AS “GLOBULAR CALCIUM FLUORIDE WHICH ACTS AS A RESERVOIR AND RELEASES FLUORIDE IONS IN RESPONSE TO PH CHANGES IN THE MOUTH” THUS RESISTING DISSOLUTION. THIS IS A TEMPORARY EFFECT.

• ALSO “ABSORBS ONTO THE ENAMEL SURFACE AND INHIBITS DISSOLUTION OF THE HYDROXYAPETITE CRYSTAL AND INCREASES THE RATE OF REMINERALIZATION”
TOPICAL FLUORIDE

• FOUND IN TOOTHPASTES, GELS, FOAMS, RINSES, VARNISH
SPELLING

• There is no flour in fluoride
WHO SHOULD BE TREATED WITH TOPICAL FLUORIDE?

• NOT EVERYONE
WHO ARE YOU GOING TO PAINT FLUORIDE VARNISH ON?

• HOW DO YOU DECIDE?
AAPD (AMERICAN ACADEMY OF PEDIATRIC DENTISTRY) FAMILY CARIES RISK ASSESSMENT TOOL

A framework for clarifying/classifying caries risk in infants, children and adolescents based on physical, environmental and general health factors

A format that is dynamic. Changes as new evidence is obtained
3 COMPONENTS ARE LOOKED AT

• CLINICAL CONDITIONS - WHAT YOU SEE AND THE CARIES HISTORY

• ENVIRONMENTAL CHARACTERISTICS - THE FLUORIDE, THE DIET, GRAZING, PARENTAL STATUS

• GENERAL HEALTH CONDITIONS
RISK CLASSIFICATIONS

- HIGH RISK
- MODERATE RISK
- LOW RISK

- THE HIGHEST PRESENCE OF A SINGLE RISK INDICATOR IN ANY OF THE 3 COMPONENT AREAS, CLASSIFIES THAT CHILD IN THE HIGHER RISK CATEGORY
### AAPD Caries-Risk Assessment Tool 2007/2008

<table>
<thead>
<tr>
<th>RISK FACTORS</th>
<th>RISK INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RISK FACTORS</strong></td>
<td><strong>RISK INDICATORS</strong></td>
</tr>
<tr>
<td>» HISTORY (BY INTERVIEWING)</td>
<td>HIGH</td>
</tr>
<tr>
<td>• DECAY PRESENT</td>
<td>YES</td>
</tr>
<tr>
<td>• PARENT/SIBLING WITH DECAY</td>
<td>YES(WITHIN NOT RECENTLY)</td>
</tr>
<tr>
<td>• DENTAL VISITS (DENTAL HOME)</td>
<td>NONE</td>
</tr>
<tr>
<td>• FLUORIDE TOOTHPASTE</td>
<td>NO</td>
</tr>
<tr>
<td>• FLUORIDATED WATER</td>
<td>NO</td>
</tr>
<tr>
<td>• FLUORIDE SUPPLEMENTS (WHERE NEEDED)</td>
<td>NO</td>
</tr>
<tr>
<td>• TIME SINCE LAST CAVITY</td>
<td>&lt;12 Mo</td>
</tr>
<tr>
<td>• TIMES/DAY TEETH BRUSHED</td>
<td>&lt;1</td>
</tr>
<tr>
<td>• WEARS BRACES</td>
<td>YES</td>
</tr>
<tr>
<td>• GRAZES</td>
<td>YES, &gt;3</td>
</tr>
<tr>
<td>• SOCIOECONOMIC STATUS</td>
<td>LOW</td>
</tr>
<tr>
<td>• SPECIAL HEALTH CARE NEEDS, ESP MOTOR</td>
<td>YES</td>
</tr>
<tr>
<td>• MED CONDITION THAT IMPAIRS SALIVA</td>
<td>YES</td>
</tr>
</tbody>
</table>
AAPD CARIES-RISK ASSESSMENT TOOL 2007/2008

- **RISK FACTORS**

- **RISK INDICATORS**

  - **CLINICAL FACTORS** *(BY EXAMINATION)*

<table>
<thead>
<tr>
<th>Risk Indicator</th>
<th>High</th>
<th>Med</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Plaque (White, Sticky Buildup)</td>
<td>Yes</td>
<td>-</td>
<td>No</td>
</tr>
<tr>
<td>Gingivitis (Red, Puffy Gums)</td>
<td>Yes</td>
<td>-</td>
<td>No</td>
</tr>
<tr>
<td>Areas of Enamel Demineralization</td>
<td>&gt;1</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>Enamel Defects and/or Deep Pits &amp; Fissures</td>
<td>Yes</td>
<td>-</td>
<td>No</td>
</tr>
</tbody>
</table>
THE SMILE CENTRE’ NEW CHILD SCREENING QUESTIONnaire

Please answer each of the following questions concerning your child:

CHILD’S NAME___________________________________
DATE__________

What age did your child get their first teeth?
Before six months ________
Between 6-12 months ________
After 12 months ________

Have you or your child’s other parent had cavities within the past 3 years?
No ________ Yes_______ Mom_________ Dad________

Brother history of cavities?___________ Sister history of cavities_______?

Who brushes your child’s teeth?
Mom_____ Dad_____ Child_____ No One______

Who flosses your child’s teeth?
Mom_____ Dad_____ Child_____ No One______

Does your child cooperate for brushing/flossing?
Always_____ Sometimes_____ Never______
• How many times a day are the child’s teeth brushed?
  – None____
  – 1____
  – 2____
  – 3____
  – More____
• What **type of toothpaste** is used for your child?
  – Non-fluoridated toothpaste_____
  – Fluoride toothpaste_____
  – Don’t know____
  – None____
• Is your **water fluoridated**?
  – Yes____
  – No_____
  – Don’t know____
• Do you use a **water filter**?
  – No____
  – Yes_____
• Does your child drink **bottled water**?
  • Only bottled water___?
  • Occasional___?
  • None___?
• Does you child take **any medications frequently**? If so, what____________?
• What **oral habits** does your child have?
  - Finger(s)_____ Thumb_____ Pacifier____ Other_____  

• When and **how often** does this habit occur?
  - All the time_____ Nap Time______ Tired Time______
  - Stress time______ In bed at night_____ Occasionally_______

• Does your child **drink** from a bottle, sippy cup, regular cup? (Circle)

• **What liquid** does your child mostly drink?
  - Water_____ Milk_____ Juice_____ Other_____  

• Does your child **eat between** meals?
  - No____ Occasionally_____ Frequently____

• Does your child **drink between** meals?
  - No____ Occasionally_____ Frequently_____
• Is your child **breast fed**?
  Currently_____ At night in bed with mother_____ 

• Does your child take **anything** other than a stuffed animal **to bed** with them at night?
  Bottle_____ Pacifier_____ Blanket_____ 

• Have you or your child’s other parent had **braces**?
  Mom_____ Dad_____ 

• Has your child suffered **any injuries** to their mouth?
  Yes_____ No_____ What age_____ 

• Do you have **any special concerns**? __________
IS FLUORIDE VARNISH THE ANSWER?
WHAT IS FLUORIDE VARNISH?

• A COLOPHONY/RESIN BASED PRODUCT DEVELOPED AND USED IN EUROPE FOR MANY YEARS THAT RELEASES FLUORIDE IONS INTO THE DENTAL ENAMEL IN HIGH CONCENTRATIONS.

• USUALLY 5% SODIUM FLUORIDE
• CONTAIN UP TO 50,000 PPM
HOW DOES FLUORIDE VARNISH WORK?

• ADHERES TO THE ENAMEL BETTER THAN OTHER FLUORIDE PRODUCTS, FORMING A DEPOT FROM WHICH FLUORIDE IS SLOWLY RELEASED

• EXTENDS THE EXPOSURE TIME OF FLUORIDE IN THE MOUTH COMPARED TO OTHER TOPICAL FLUORIDES.
FLUORIDE VARNISH

• FLOURIDE VARNISHES ARE INTENDED TO REMAIN IN CLOSE CONTACT WITH ENAMEL FOR HOURS.

• WORKS BY INCREASING THE CONCENTRATION OF FLUORIDE IN THE OUTER LAYERS

• ESPECIALLY CONCENTRATED IN DEMINERALIZED AREAS

• DRYING IS SUFFICIENT TO “CLEAN” THE TEETH BEFORE APPLICATION
ADVANTAGES OF FLUORIDE VARNISH

• APPLY IN LESS THAN ONE MINUTE
  – DOES NOT REQUIRE SPECIAL EQUIPMENT OR THE
    NEED FOR A PROPHYLAXIS PRIOR TO APPLICATION

• SETS ON CONTACT WITH SALIVA

• NEUTRAL, BUBBLEGUM, MINT, CHERRY VANILLA,
  MELON, CHERRY

• PREVENTION OF CARIES

• DELAYS CARIES PROGRESSION
https://decs.nhgl.med.navy.mil/1QTR07/PRODUCTEVALUATIONS/fluoridevarnishssynopsis.htm

THIS SITE GIVES THE COSTS AND GIVES UNBIASED EVALUATIONS
VANISH VARNISH (OMNI)
AMOUNT TO APPLY

• BRUSH ON A 0.5 MM LAYER TO ALL SIDES OF EACH TOOTH
  – FACIAL
  – LINGUAL (BACK)
  – INTERPROXIMAL (SIDES) [WHEN TEETH NOT TOUCHING] (I TRY TO FORCE IT BETWEEN ESPECIALLY THE MAXILLARY CENTRAL INCISORS)
  – OCCLUSAL/INCISAL (BITING SURFACE)
FOLLOWUP INSTRUCTIONS

• CHILD CAN EAT OR DRINK IMMEDIATELY – A BIG +
• DON’T BRUSH OR FLOSS THE TEETH UNTIL TOMORROW
• SOFT DIET IS BETTER FOR THE REST OF THE DAY
• “STICKY TOOTHPASTE”
SAFETY

• MULTIPLE EUROPEAN STUDIES (AS EARLY AS 1966)
• MULTIPLE STUDIES SHOW TOXICOLOGIC SAFETY
SAFETY

– Beltran-Aguilar, Goldstein, Lockwood. JADA, 2000
EFFICACY


AND IF IT IS EFFICACIOUS...

• HOW OFTEN SHOULDN'T IT BE APPLIED?
HOW MANY TIMES TO APPLY PER YEAR?

• NO CURRENT CONSENSUS
  – 4 APPLICATIONS PER YEAR
  – 3 APPLICATIONS IN 1 WEEK
     – PROBABLY NOT
  – 3 WEEKLY APPLICATIONS
     – PROBABLY NOT
  – MINIMUM OF 2 PER YEAR

AND THE CURRENT ANSWER IS...?

3+ TIMES PER YEAR?
SHOULD FLUORIDE VARNISH BE PAINTED ON ALL CHILDREN AGES ....1\textsuperscript{ST} TOOTH TO 5 (3?) YEARS OLD??

• IF AT RISK, “YES”
  – 2X
  – 3+ X

• IF NO VISIBLE CARIES, NO CARIES HISTORY IN FAMILY, NO POSITIVE RISK FACTORS, PARENT IS INVOLVED AND LISTENING AND YOU THINK THE CHILD WILL BE SEEN IN A DENTAL HOME, THEN “NO”
ADVANTAGES OF FLUORIDE VARNISH

• EFFICACIOUS – IT WORKS WELL!
• EASY TO APPLY
• SAFE
• “INEXPENSIVE”
DISADVANTAGES OF FLUORIDE VARNISH

• IT CLOGS UP THE SUCTION!!!
SO............

• USE FLUORIDE VARNISH ON HIGH RISK KIDS AFTER DOING A RISK ASSESSMENT

• GIVE PARENT SIMPLE ORAL HEALTH COUNSELING...
  – CAVITIES ARE INFECTIOUS!!!
  – PASSED FROM PARENT TO CHILD BY SPIT!!!
  – MILK AND JUICE IN A BOTTLE/SIPPY CUP WHERE THE CHILD CAN DRINK “AT-WILL” IS A MAJOR PROBLEM!!!
  – NO BOTTLE AT NIGHT OR NAP TIME!!!

• REPEAT FLUORIDE VARNISH TREATMENTS EVERY 3 OR 4 MONTHS

• ENCOURAGE A DENTAL HOME
MAKING ORAL HEALTH A PRIORITY IN KANSAS

BECAUSE IT MATTERS