Oral Health Promotion

- Disease Pattern
- Consider the causes, repair the damage
- Health Education

Transmissibility of Dental Caries

Caries Transmissibility

“In humans, mothers are important source of transmission of S. mutans to their children.”

Keyes, 1960

“The incidence of caries in children could be reduced if the infection with S. mutans would be reduced or prevented until the eruption of the primary and permanent teeth.”

Abiusua, S. & Renfors, 1983
Caries Transmissibility

Children (<2 yo)
Cariogenic microorganism
10.6 surfaces with caries 4 years old

Children (<2 yo)
Cariogenic microorganism
0.3 surfaces with caries 4 years old

Alaluusua, S. & Renfonen, O. V., 1983

Types of Dental Caries
- Smooth Surface caries
- Pit and fissure caries
- Enamel caries
- Dentinal Caries
- Early Childhood Caries
- Root Caries

Caries Lesion Progression

Attack Rates and amount of demineralization depend on many factors:
The greater the number of highly cariogenic microorganisms in the plaque – the greater the production of acid per unit of time.
The older the dental plaque – the greater the production of acid per unit of time.
When saliva quantity is low – the buffer capacity is reduced.

Dental Caries is determined by the dynamic balance between pathological factors that lead to demineralization and protective factors that lead to remineralization.

Featherstone JD 2004 J Dent Res.
Traditional Dentistry

- Surgical and Restorative concepts
- Diagnosis, cavity preparation, restoration
- Based on mechanical (Technical and operative) procedures to “treat” caries

Restorative procedures should be seen simply as prosthetic, making up for lost tissues.

Repetitive Restorative Cycle

- Progressive Mutilation
- Irreversible Damages

Elderton, R.J., 1997.

The sequence of events with respect to caries should usually be diagnosis followed by treatment, and then the option of restoration if appropriate.
**Dentistry Nowadays**

- Oral Health promotion
- Treatment based on educational and preventive procedures
- Equilibrium between de- and remineralization

Stop the progression of the disease
Diagnosis of the caries activity
Prevent new lesions
Arrest present lesions
Avoid recurrence

Current concepts of the nature and etiology of caries have considerable implications for today's dental practice. The recognition that the caries process is potentially reversible in its early stages implies that restorations should not be considered as the preferred management option for the precavitated lesion.

**Dental Caries - Concepts**

- Ethiological Factors
  - Fluoride
  - Saliva composition and flow
  - Salivary buffering capacity
  - Bacterial plaque
  - Caries susceptibility


**Dental Caries - Concepts**

- Socio-economic Factors (social class, education, income)
- Behavioral Factors (behavior, attitudes, knowledge)

**Medical and Dental History**

- Behavior
- Attitudes
- Check the conditions for the establishment of the disease
- Diet evaluation
**Medical and Dental History**

- **Age**
- Using medication that reduces salivary flow
- Sugar-countaining medication
- Inadequate fluoride exposure
- Cariogenic diet
- Irregular dental visits
- Compromised oral hygiene

**Medication x Salivary Flow**

Saliva is a modulate factor for caries development

- Anticholinergics, anorexigens, antihistaminics, antidepressives, antipsychotics, antihypertensives, antiparkinsonians ➔ xerostomia

Sugar-free Chewing gums
Artificial saliva

**Medication and Dental History**

- **Age**
- Using medication that reduces salivary flow
- Sugar-countaining medication
- Inadequate fluoride exposure
- Cariogenic diet
- Irregular dental visits
- Compromised oral hygiene

**Fluoride Exposure**

- Regulates the De-Remineralization
- Information about the concentration of fluoride in the water, use of dentifrice, mouth rinses, tablets and, professional applications

**Medical and Dental History**

**Therapy Recommendations**

<table>
<thead>
<tr>
<th>Caries Risk</th>
<th>Children/Adolescent</th>
<th>Adults</th>
<th>Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Self-care education (Parent)</td>
<td>Fluoride Dentifrice</td>
<td>Fluoride Dentifrice</td>
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<tr>
<td></td>
<td>Fluridized water</td>
<td>Plaque control</td>
<td>Recalls (8-12 months)</td>
</tr>
<tr>
<td>Moderate</td>
<td>Self-care education (Parent)</td>
<td>Plaque control</td>
<td>Fluoride Dentifrice</td>
</tr>
<tr>
<td></td>
<td>Fluoridized water</td>
<td>Plaque control</td>
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<td>Self-care education (Parent)</td>
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<td>Fluoride Dentifrice</td>
</tr>
<tr>
<td></td>
<td>Fluoridized water</td>
<td>Plaque control</td>
<td>Recalls (3-4 months)</td>
</tr>
<tr>
<td></td>
<td>Chlorhexidine Gel</td>
<td>0.05% NaF daily</td>
<td>Foam, Gel</td>
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<tr>
<td></td>
<td>Diet counseling</td>
<td>Self-care education</td>
<td>Plaque control</td>
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<td>Diet counseling</td>
<td>Fluoride Dentifrice</td>
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</table>
• United States:
  – Reduction in dental caries due to water fluoridation from 1980 to 1987: 36%.
  – Children exposed to community water fluoridation had mean DMFS scores about 18% lower than those who had never lived in fluoridated communities.

Brunelle, J.A.; Carlos, J.P. J Dent Res. 1990

Using medication that reduces salivary flow
Sugar-containing medication
Inadequate fluoride exposure
Cariogenic diet
Irregular dental visits
Compromised oral hygiene

Brunelle, J.A.; Carlos, J.P. J Dent Res. 1990

Consumption of fermentable carbohydrates
Diet Query
- Diet counseling
- Analysis of the consumption of fermentable carbohydrates
- Intelligent consumption of carbohydrates


Diet
Evaluation of 3 yo children in daycare centers and child’s garden
High prevalence of caries is related with high frequency of sugar consumption


Gustafsson et al. 1946 - 1951
436 adult patients in a Mental Health Hospital
Introduction of sucrose in diet increase the incidence of caries


pH drop due to acid produced by bacteria fermenting the sucrose

Stephan’s Curve

pH Plaque
**Diet Counseling**

Basic principles for diet counseling:
- Evaluation of the patient’s diet
- Suggestions to modify the main meals
- Give reliable options of alternative food for the patients
- Exclude snacking and sugar intake between main meals


**Clinical Exam**

Good light source
Oral profilaxis - plaque removal
Clean and dry tooth surface

**Clinical Exam**

Instrumental for clinical exam

**Use of Explorer**

High pressure probing can cause irreversible damages in the enamel potentially able to remineralize

Barbakow, F. et al.; 1991
Kidd, E.A.M. et al; 1993
Newbrun, E. 1993

**Clinical Exam**

CLINICAL EXAM

Instrumental for clinical exam

USE OF EXPLORER

HIGH PRESSURE PROBING CAN CAUSE IRREVERSIBLE DAMAGES IN THE ENAMEL POTENTIALLY ABLE TO REMINERALIZE

ADAPTED BARBAKOW ET AL.; 1991

Breakfast 10 min 30 min 120
Lunch 5 min 30 min 120
Dinner 10 min 60 min

pH Plaque

Breakfast 10 min 30 min 120
Lunch 5 min 30 min 120
Dinner 10 min 60 min

pH Plaque

Xylitol Xylitol

pH drops due to acid produced by bacteria fermenting the sucrose

Kidd, E.A.M. et al; 1993


Barbakow, F. et al.; 1991
**USE OF EXPLORER**

High pressure probing can cause irreversible damages in the enamel potentially able to remineralize.

Barbakow, F. et al., 1991
Kidd, E.A.M. et al., 1993
Newbrun, E., 1993

**CLINICAL EXAM**

"The use of explorer (probing) is not adequate for diagnostic of occlusal caries; besides the inadequate use of an explorer can cause damages to the demineralized enamel surface" Ekstrand, K. et al., 1987

**CLINICAL EXAM**

"The occlusal lesions develop through the lateral walls in the fissures" Thomsen, J. R. et al., 1988

"The carious process often begins at the entrance of the fissures" Lussi, A., 1991

**DIAGNOSIS**

*Tactile - Explorer*

- Cavitation: Ekstrand et al., 1987
- Transfer cariogenic microorganisms from one surface to another non-infected: Loesche et al., 1979

**VISUAL**

**DIAGNOSIS**

- Non-invasive
- Most commonly used

- Good visual access - tooth surfaces
  - Dry and clean surfaces
  - Good light source - illumination

**Diagnosis**

- The presence or absence of caries lesions can be represented by:
  - White spot lesion
  - Inactive white spot lesion (smooth and shiny)
  - Active cavitated lesion (soft, moist and gray in appearance, harbor more bacteria)
  - Non-active cavitated lesion (hard, dry and dark in appearance, harbor fewer bacteria)

- To consider: color, texture and location
CLINICAL EXAM

Clinical Aspect

Diagnosis

White and opaque surface, inadequate oral hygiene – presence of biofilm

Clinical Diagnostic

Active Cavitated Caries

Arrested Caries

Active Lesions x ARRESTED

Shiny and smooth white spot lesions distante from the gingival line
 Cavitated, hard and dark

• Identification: 38-year-old male
• Vital statistics:
  • Height: 5’8
  • Weight: 185 lb.
  • Blood pressure: 124/78 mm Hg
  • Pulse: 64 bpm and regular
• Chief complaint: “Brown stains on the teeth, and my gums are bleeding.”

PINELLI, C. et al. 1999
Teeth Staining:
- Duration: 6 years
- Used to have high frequency of sugar snacks
  - 8 years ago changed diet – no more sugar snacks
  - Replaced the snacks for tea (weight loss)

Bleeding:
- Duration: 3 months
- Following brushing

Smoking:
- 5 cigarettes / day

Dental History
- Irregular dental care for last decade (emergencies)
- Social History: Farmer
- Home care: Brushes (once a day) and flosses (rarely)
- Habits/Behaviors: Positive smoking history
- Family History: hypertension and periodontitis (parents)

Intraoral Exam
- No mucosal lesions detected (WNL)
- Missing teeth: #1, 3, 16, 17, 30, 32
- Restorations: Occlusal amalgams #4 MO, 7(IRM) ML, 8(IRM) DL
  10 Composite ML, 11 (IRM) ML, 14, 15 DO amalgam, 19 amalgam MODL, 29 amalgam O, 31 amalgam MODV
- Plaque Index (O’Leary): 40%
- Bleeding Index (Muhlemann and Son): 30%

• What type of caries lesion does the case exhibit?
• How we classify this case regarding periodontal disease?
• What preventive interventions are indicated indicated?

Clinical Exam

Active Lesion
- Yellow/Brown
- Soft

Inactive Lesion
- Dark brown or black
- Shiny

Lasicola, N. T. 1997
Maltz, M. & Carvalho, J., 1999
**RADIOGRAPHIC DIAGNOSTIC**
- Non invasive method
- Possible to exam inaccessible regions
- Caries extension
- Documentation
- Helps to evaluate caries activity and the efficacy of therapeutic methods

Thylstrup, A. & Fejerskov, O. 1995

**PROXIMAL TOOTH SEPARATION**
- Ortho elastic separators
- Brass wire
- Wood wedge
- Elastic rubber blocks

Pinelli, C. et al. 1999

**PROXIMAL LESIONS**

**CLINICAL DIAGNOSIS**

Clinical Aspect
- Rx Diagnostic
- Clinical Diagnostic

**NON INVASIVE METHOD**
- Possible to exam inaccessible regions

**ARRESTED PROXIMAL LESION**

**CARIES EXTENSION**

**DOCUMENTATION**
- Helps to evaluate caries activity and the efficacy of therapeutic methods

**ORTHODONTIC SEPARATION**
- Ortho elastic separators
- Brass wire
- Wood wedge
- Elastic rubber blocks

Pinelli, C. et al. 1999

**CAVITATED PROXIMAL LESION**
CLINICAL ASPECT
Anterior Teeth

CLINICAL ASPECT
OCCUSAL SURFACE
Dry and clean

Maltz, M. & Carvalho, J. 1999

Hidden Caries
The identification of factors responsible for caries activity is important as a basis for targeted actions against the main etiological factors. To determine the caries risk, similar etiological factors should be considered.

**Caries Risk**

- Low Risk
  - No new or incipient carious lesions in the past year
  - No new or incipient carious lesions

- High Risk
  - Deep and pigmented fissures
  - Poor oral hygiene
  - Incidence of 2 or more new lesions within 1 year
  - High activity of caries in smooth surface/root surface in the past
  - Visit the dentist only when he/she has a problem
  - Maladapted restorations (margins)
  - High frequency of carbohydrates
  - Low frequency or no use of fluoride
Diagnosis and Management of Dental Caries Throughout Life
National Institutes of Health
Consensus Development Conference Statement

Strategies for oral disease prevention and health promotion

Cariogram

Preventive Clinical Strategies for Dental Caries

Luis A. Pimenta, DDS, MS, PhD
Clinical Professor
Dental Ecology - UNC
Caries risk-based prevention program

Children

Adult

Seniors

Caries Risk Assessment

Low

Moderate

High

Preventive Strategies in Infants

- Parent’s oral condition
- Early screening
- Risk assessment

- Daily toothbrushing – fluoridated dentifrices
- Fluoride varnish application
- Use of chlorhexidine gels and varnishes
- Sealants on precavity pit and fissure lesions

Preventive Strategies in Children

- Parent’s oral condition
- Early screening
- Risk assessment

- Daily toothbrushing – fluoridated dentifrices
- Cleaning and professional fluoride application (Gel/Foam)
- Fluoride varnish application
- Use of chlorhexidine gels and varnishes
- Sealants on precavity pit and fissure lesions

Preventive Strategies in Infants

CRA Procedures

Low
- Daily toothbrushing – FTP
- Periodical Examination (annual)
- Diet counseling

Moderate
- Daily toothbrushing – FTP
- Fluoride varnish application
- Periodical Examination (6 months)
- Diet counseling

High
- Daily toothbrushing – FTP
- Fluoride varnish application
- Chlorhexidine gel and varnish
- Sealants on precavity lesions
- Periodical Examination (3-4 months)
- Diet counseling

Preventive Strategies in Children

CRA Procedures

Low
- Daily toothbrushing – FTP
- Periodical Examination (annual)
- Diet counseling

Moderate
- Daily toothbrushing – FTP
- Daily mouthrinse (0.05% NaF) – 6y/o and older
- Cleaning and fluoride (gels/foam)
- Fluoride varnish application
- Sealants
- Periodical Examination (6 months)
- Diet counseling

High
- Daily toothbrushing – FTP
- Daily mouthrinse (0.05% NaF) – 6y/o and older
- Cleaning and fluoride (gels/foam)
- Fluoride varnish application
- Chlorhexidine gel and varnish
- Sealants on precavity lesions
- Periodical Examination (3-4 months)
- Diet counseling
Preventive Strategies in Adults

- Individualized and accurate caries DX
- Past caries experience
- Salivary flow
- Caries-risk assessment
  - Sjogren's syndrome, pharmacological agents with xerostomic side effects
  - Therapeutic radiation to the head and neck
  - Lower salivary flow rate to pathological levels and dramatically elevates a patient’s risk of caries
- Daily toothbrushing – fluoridated dentifrices
- Cleaning and professional fluoride application (Gel/Foam)
- Fluoride varnish application
- Use of chlorhexidine gels and varnishes
- Artificial saliva, sugar-free chewing gum (salivary pathology)
- Sealant or Minimally invasive restorative procedures – cavitated lesions

Preventive Strategies in Adults

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</tbody>
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Preventive Strategies in Elderly

- Individualized and accurate caries DX
- Past caries experience
- Salivary flow
- Caries-risk assessment
- Daily toothbrushing – fluoridated dentifrices
- Cleaning and professional fluoride application (Gel/Foam)
- Fluoride varnish application
- Use of chlorhexidine gels and varnishes
- Artificial saliva, sugar-free chewing gum (low salivary flow)
- Sealant or Minimally invasive restorative procedures – cavitated lesions

Preventive Strategies in Elderly

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</table>

Preventive Materials and Procedures

**Toothbrushes**
- Manual
- Electric powered
- Sonic

**Dental Floss**
- Waxed
- Non-waxed
Interproximal toothbrushes

Patients with fixed orthodontic appliances
Patients with fixed bridges
Patients with periodontal disease

Powered toothbrushes and manual toothbrushes are generally equally effective in plaque removal.

Patients with fixed orthodontic appliances
Handicapped and children with mental disabilities
Institutionalized patients including the elderly who are dependent upon care providers

Dental Prophylaxis and Professional Fluoride Application

Plaque Removal
Fluoridated tooth paste
Autoclavable or disposable angles (low speed)

Professional Fluoride Application

Foam (0.9% [9,040 ppm] NaF)
2% NaF rinse
2% NaF Gel – Neutral pH

1.23% APF

PROSPEC™ Mi Paste - RECALDENT™ (CPP-ACP).
Delivers bio-available calcium and phosphate when they are needed most.
Binds calcium and phosphate to tooth surfaces, plaque and surrounding soft tissue.
Releases the calcium and phosphate when a patient’s saliva is acid challenged by the normal digestive process.

PROSPER™ Mi Paste - RECALDENT™ (CPP-ACP).
Delivers bio-available calcium and phosphate when they are needed most.
Binds calcium and phosphate to tooth surfaces, plaque and surrounding soft tissue.
Releases the calcium and phosphate when a patient’s saliva is acid challenged by the normal digestive process.

MI Paste Indications
For post-bleaching sensitivity.
Restorative and scaling prophylaxis.
Additional treatment for salivary dysfunction, sensitivity, erosion, and unhealthy enamel.
Xerostomia (dry mouth), and Sjogren syndrome.
Replaces lost minerals, improves the protective qualities of saliva, improves fluoride uptake, and soothes sensitive surfaces.
**Fluoride Varnishes**

**Duraphat** (Colgate Oral Pharmaceuticals, Inc., Canton, Mass).
- 5% sodium fluoride varnish provided in tubes containing 10 ml of product.

**Duraflor** (Pharmascience, Montreal, Canada).
- 5% sodium fluoride varnish, which is provided in 10 ml tubes.

**Fluor Protector** (Ivoclar/Vivadent, Amherst, N.Y.).
- 1% difluorosilane varnish provided in 1 ml ampules and 0.4 ml single dose units.

**Vanish White Varnish** (OMNII Oral Pharmaceuticals, West Palm Beach, Fla.).
- 5% sodium fluoride varnish - comes in unit-dose packages with an application brush.

**Clinical Indications – Fluoride Varnishes**

- Moderate caries-risk patients – every 6 months
- Higher caries-risk patients – every 3-6 months
- Adults and Elderly with root exposure
- Dentin hypersensitivity
- Cavity varnish
- Institutionalized patients.
- Patients receiving orthodontic therapy.

**Cervitec – 1% Chlorhexidine varnish**

Reduces the number of S mutans

Reduces caries incidence in the permanent molars of 6-7-year-old children when applied three monthly. *Community Dentistry and Oral Epidemiology* - October 2002

1% chlorhexidine gel Corsodyl, administered 6 times during 2 days, is more effective in suppressing MS in the margins of restorations and in saliva than the 1% chlorhexidine varnish Cervitec, administered twice within 3-4 days. *Caries Research* - 2002

**Artificial Saliva**

Saliva plays a significant role in oral health by maintaining a neutral oral pH.

- Protects oral tissue against invasion by microorganisms
- Collaborates in the remineralization process
- Facilitates swallowing and digestion by lubrication and through special enzymes, and acts as solvent for the taste stimuli

Saliva Substitute are approved by the U.S. Food and Drug Administration

- Indicated for the symptomatic relief of dry mouth and dry throat in patients with xerostomia or patients with Sjogren's Syndrome

- There are no specific dosing guidelines; both can be used as often as needed

- Moistening and lubricating action is of limited duration, necessitating repeated administration

Spray two or three times directly onto and under the tongue, and to both sides of the mouth, swallow any excess. Repeat as required.
INDICATIONS FOR FLUORIDE LOZENGES

- Drug Induced Xerostomia
- Rampant Decay
- Radiation Treatments
- Cardiac Medications
- Sjogren’s Syndrome
- Cancer Treatments
- Periodontal Therapy
- Extensive Restorations
- Orthodontic Appliances

Dental Sealants

“The occlusal lesions develop through the lateral walls in the fissures” Thomsen, J. R. et al., 1988

“...and the process of tooth decay is apparently arrested by the sealant.”

Hinders the penetration of bacteria
Blocks the supply of carbohydrates
Facilitates better oral hygiene

Caries Progression
Occlusal Surface

Highly effective in preventing pit and fissure caries
Protection is 100% in pits and fissures that remain completely sealed
Minor carious lesions covered by sealants seem to become inactive, and the process of tooth decay is apparently arrested by the sealant
Negative or reduced bacterial cultures following several years of sealing

Dental Sealants

Newly erupted teeth with pits and fissures.
Person whose lifestyle, developmental or behavioral patterns, or lack of fluoride exposure put them at high risk for dental caries.
Teeth that have pits and fissures that are anatomically susceptible to caries, with moderate or high caries-risk
Other persons who desire sealant application and for whom sealant therapy is technically feasible.
Dental Sealants

Conserves healthy tooth structure
Adopts a philosophy that integrates prevention, remineralization and minimal intervention for the placement and replacement of restorations
Removal of the minimal amount of healthy tissues
Maximal conservation of healthy tooth structure should be the main consideration

Minimally Invasive Dentistry

Conserves healthy tooth structure
Adopts a philosophy that integrates prevention, remineralization and minimal intervention for the placement and replacement of restorations
Removal of the minimal amount of healthy tissues
Maximal conservation of healthy tooth structure should be the main consideration