Putting the Mouth Back into the Body

The Common Risk Factor Approach

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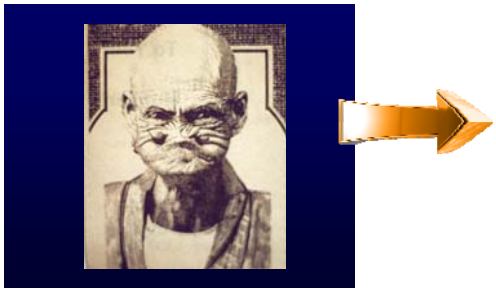
Oral Health Maintenance



Health Maintenance

They're only teeth…

Diabetes Mellitus (DM)

- 20-24 million diabetics in the United States
- 7-8% of US population
- 1.5 million new cases diagnosed in 2005
- Estimated 30% may be undiagnosed

Diabetes Mellitus (DM)

- Most common disorder in patients admitted to hospitals for any cause
- Accounts for 30% of primary care visits although it affects <10%

Diabetes (DM)

- Inadequate glycemic control increases the risk of
  - Retinopathy
  - Nephropathy
  - Neuropathy
  - Macrovascular conditions (→ stroke, peripheral vascular disease or myocardial infarction)

Diabetes and Periodontal Disease

- Well established bidirectional relationship
- Poor oral hygiene with periodontal inflammation leads to poorer glycemic control
- Poorly controlled diabetics are at risk of more aggressive periodontal destruction

Health education for diabetics

- Partnership between
  - Physicians, nurses, diabetes educators
  - And
  - Dentists and dental hygienists

Diabetes and Dental Practitioners

- Assess for gingivitis and periodontitis
- Ask about diabetes and family history
- Ask about related symptoms—thirst, weight loss,
- Ask about related comorbidities: hypertension and hypercholesteremia
- Refer for medical evaluation

Diabetes and Medical Practitioners

- Ask about dental practices
  - Regularity of dental care
  - Known presence of gingivitis or periodontal disease
  - Oral hygiene practices
- Refer for oral health maintenance care

Diabetes and Dental Practitioners

- The risk in the office: Hypoglycemia
  - Medical history
  - Questions
    - Did you take your medications?
    - Did you eat before you came?
  - Have sugar source available
  - Consider having testing available

Nosocomial Pneumonia

- >20,000 deaths per year from hospital- acquired pneumonias
  - 84% in people over age 65
- Ventilator-associated pneumonias—8-28% of all intubated patients
- Nursing home-acquired pneumonia—leading cause of death in NH population

Shay et al

Risk Factors→Pneumonia

- Dependence for feeding
- Dependence for oral care
- Tube feeding
- Current smoking
- Multiple medical diagnoses
- Number of medications
- Number of carious teeth

Langmore et al/Shay et al

Risk Factors→Pneumonia

- COPD
- Diabetes
- Dependence for feeding
- Presence of SA in saliva
- If dentate
  - Number of carious teeth
  - Numbers of pairs of opposing teeth
  - Presence of periodontal-disease causing organisms in saliva or plaque

Terpenning et al/Shay et al

Nosocomial Pneumonia

- In 8 of 14 patients with hospital-acquired pneumonia, bacterial genotype of plaque matched those from pulmonary lavage samples.

El-Solh et al/Shay et al

The converse

- Greater plaque accumulation in institutionalized patients than community dwelling
- More colonization with respiratory pathogens

Shay et al

"Floss or Die"

- Literature supporting an association between periodontal inflammation and cardiovascular disease (CHD)—mixed results
- Literature not strong in human epidemiologic studies
- More direct association in *in vitro* and in animal studies

"Floss or Die"

- Increased levels of *P gingivalis* → enhanced atherosclerosis in mice
- Periodontal disease → ↑ LDL-C, ↑ triglycerides, and ↓HDL's
- Treatment improves the lipoprotein profile

"Floss or Die"

- VA Longitudinal study found positive dose-dependent association between periodontal disease and CHD in men under age 60
  - Direct (bacteremia or systemic inflammation)
  - Indirect (common genetic and/or environmental factors)

Dietrich et al. Circulation 2008

"Floss or Die"

- Scottish study found association between poor oral hygiene and increased risk of cardiovascular disease
- Same issue of causality of the association

deOliveira et al. BMJ 2010

Strategies for controlling oral diseases

- **"Get rid of all those foreign bodies!"**
- Reduce the risk
  - Alter the availability of nutrients for the microorganisms
  - Reduce the pathogenic microorganisms
  - Make the host less vulnerable

Not the health goal we are after…

Strategies for controlling oral diseases

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  - **Make the host less vulnerable**

Reducing host vulnerability

- ***Managing salivary hypofunction***

Salivary Flow

- Essential to the maintenance of oral tissues

AREA OF RESEACH

- DIAGNOSTIC TESTS
  - For use in health surveillance
  - Biomarkers that act as proxies for particular physiologic states

SALIVARY GLANDS

- Parotid
- Submandibular
- Sublingual
- Minor mucous glands

SALIVARY FLOW RATE

- Wide range of normal
- Hyposalivation→xerostomia
- Stimulated and unstimulated

SALIVARY FLOW RATE

- Influences
  - Degree of hydration
  - Body position
  - Exposure to light
  - Previous stimulation
  - Circadian and circannual rhythms
    - **During sleep, salivary flow is negligible

HYPOSALIVATION

- Main causes
  - **THERAPEUTIC DRUGS**
  - Sjőgren's syndrome
  - Radiation for head and neck cancer
  - Rheumatoid arthritis
  - SLE

Functions of Saliva

- Initiation of digestion
- Lubrication of tissues
- Mastication and bolus formation
- Buffering
- Antibacterial, antiviral, antifungal
- Maintenance of tooth integrity

FUNCTIONS

- Lubricant to protect against irritants
  - Mechanical
  - Thermal
  - Chemical

FUNCTIONS

Protection of the oral tissues
- Debridement
- Agglutination
- Pellicle formation

FUNCTIONS

- Solvent
  - Taste
- Moisture
  - Swallowing

FUNCTIONS

- Buffering capacity
- Ion reservoir (remineralization of tooth structure)
- Antimicrobial activity
  - Antibacterial
  - Antifungal
  - Antiviral

Sequelae of Xerostomia

- Candidiasis—fungal infection
- Mucositis
- Dysphagia
- Poor denture retention
- Speech difficulty
- Increased periodontal disease
- Increased caries (tooth decay)--especially root caries

Causes of Xerostomia

- Not age
- **Medications**
- Autoimmune diseases
- Radiation
- Local gland problems
- Fluid and electrolyte problems

Medications

- Anticholinergics
  - Sedative hypnotics
  - Neuroleptics
  - Antidepressants
- Acetylcholine blockade
  - Ditropan, Artane, Cogentin
- Antihypertensives
- Narcotics

XEROSTOMIA

- Quality of life issue
  - Causes difficulty in
    - eating
    - speaking
    - swallowing
    - tasting
    - wearing a prosthesis

FUNCTIONS OF SALIVA
Antimicrobial


FUNGAL
INFECTION

FUNCTIONS OF SALIVA
Contributes to reducing the incidence of dental caries


DENTAL CARIES ASSOCIATED WITH DRY MOUTH

- Rampant
- Gingival margin
- Wrap-around to amputation
- Sometimes in the absence of poor oral hygiene

DENTAL CARIES

- Microorganisms + fermentable carbohydrates → acids
- → demineralization of enamel and dentin

EQUILIBRIUM

- Microorganisms + CHO → acid
- Buffering agents of saliva → increased pH

SALIVA

- Changes concentration of proteins and ions
- Increases concentration of bicarbonate
  - Diffuses into plaque
  - Neutralizes plaque acids
  - ↑ pH of plaque
  - Favors remineralization of enamel and dentin

STRATEGIES TO CONTROL CARIES RATE

Reducing host vulnerability

- ***Managing salivary hypofunction***

Management of dry mouth

- Stimulation
- Replacement
- Protection

SALIVARY STIMULATION

- **Gum Chewing**

CHEWING GUM

- Chewing sugar-free gum after meals→ significant reduction in development of dental caries
- Increases cerebral blood flow

CHEWING GUM

- Xylitol
- Sorbitol
- Other-itols

SALIVARY STIMULATION

- Chewing sugar-free gum
- **Sugar-free candies and mints**

SALIVARY STIMULATION

- Chewing sugar-free gum
- Sugar-free candies and mints
- **Pharmacologic interventions**
  - Pilocarpine (Salagen) 5-10 mg tid
  - Cevimeline (Evoxac) 30 mg tid
  - or
  - ***Change medications if possible***

Management of dry mouth

- Stimulation
- **Replacement**
- Protection

Salivary Replacement

- Water
- Ice
- Artificial saliva

Strategies for controlling oral diseases

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Protection

- Antimicrobials
- Fluoride / APC
- Oral hygiene

Reducing host vulnerability

- **Fluorides and amorphous calcium phosphate**
- Managing salivary hypofunction

Fluoride

- Daily fluoride (NaF—RX)
- Fluoride dentifrice, mouthwash—OTC
- Office fluoride treatments—fluoride varnishes

Fluoride Gels (prescription)

- 1.1% neutral NaF gel
- 1.1% neutral NaF dentifrice

Amorphous Calcium Phosphate

- MI paste
- Available from dentists
- In products (gum)--Recaldent

Langmore et al/Shay et al

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Chemotherapeutically

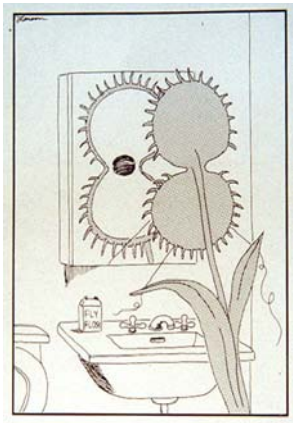
- Chlorhexidine gluconate (.12% in U.S.)
- Phenolics (Listerine)
- Triclosan

PLAQUE CONTROL

- Chlorhexidine
  - RX: 1 oz bid for 2 weeks every 2-3 months

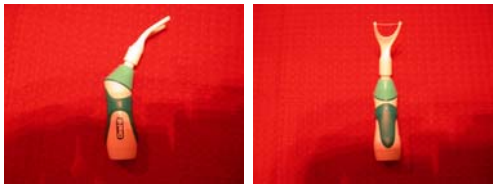
Brushing

Flossing



Flossing

Flossing gadget



Other interdental cleaners

Tongue cleaners

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REDUCING RISK OF DENTAL CARIES (and fungal infections)

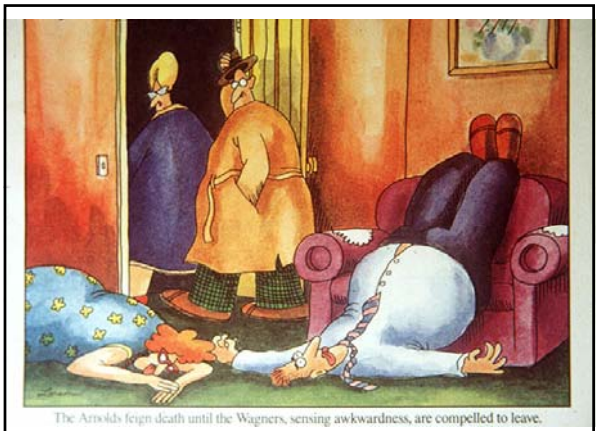
- AVOID FREQUENT CARBOHYDRATES

REDUCING RISK OF DENTAL CARIES (and fungal infections)

- AVOID FREQUENT CARBOHYDRATES

Oral Health

- Systemic considerations
- Quality of life
  - Masticatory function
  - Social interchange
  - Freedom from pain



ASSESSMENT OF SALIVARY FUNCTION

- Questionnaire
- Visual analogue scale
- Objective measurement of quality and quantity of saliva

ASSESSMENT OF SALIVARY FUNCTION

- Questionnaire
  - Does the amount of saliva in your mouth seem like too little?
  - Does your mouth feel dry when eating a meal?
  - Do you have difficulty swallowing any food?
  - Do you sip liquids to aid in swallowing dry food?

Salivary hypofunction

- Creates an environment favorable to colonization of microorganisms

Caries


Candidiasis