Identifying & Managing Oral Health Conditions of the Aging Patient

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Conflict of Interest Disclosure

• I have no financial interest in any of the products or techniques featured in the presentation
• I own no stock in any dental or dental product company
• I have no ongoing sponsorship or speaker funding relationship with any dental company
• I am a member of the Catapult Group, Chicago, IL and evaluate dental products for Catapult
• I am former Clinical Research Director Dentsply Prosthetics (2002-2012) & Directed Technology Transfer GC Corp. (1999-2002)
Nels Ewoldsen DDS, MSD
Conservative Dental Solutions
Waveland, Indiana  (population 420)
Aging in America (& the world)……

Oral Conditions = Caries, Periodontal Disease, Mucositis & Tooth Loss

- Managing Acute Caries & Workforce Expansion

-Biofilm Management (Candidiasis, Pneumonia, Caries)

-Saliva Management (saliva substitutes, pilocarpine, cevimeline)

-Managing Edentulism (Partial & Complete) New Techniques/Technology
Oral Health Needs of the Frail Elderly

Frailty: various levels of dependency resulting from impaired neurologic control & energy levels below a critical threshold (MacEntee MI, J Canadian Dent Assn 2006) “We must seek simple, relatively inexpensive solutions to tooth loss” .....”chronic, non-communicable impairments including caries, periodontitis, mucositis & tooth loss constitute the biggest challenge to health care systems everywhere.”

Dr. Margaret Chan (Director-General WHO) “the rising financial burdens of these diseases will reach levels beyond the capacity of even the wealthiest countries in the world to manage”
Coronal polishing, mechanical toothbrushing prior to the oral examination
Midwest RDH Freedom Cordless Prophy System

...yes we do house calls
Palatal papillomatosis (denture induced inflammatory hyperplasia) & Xerostomia
The ability to quickly reline, repair, & construct complete/partial dentures is essential.
“If partially and completely edentulous elderly cannot afford anything other than acrylic-resin prostheses …prosthodontics must provide access to simpler, sound treatment.”  P. Owen, 2015 ICP Special Session on Geriatrics
Observation: Progressive atrophy and reduced mean thickness of oral mucosa. Decreased nutrient intake lowers the threshold of soft tissue to denture irritation. Xerostomia compromises soft-tissue health, denture tolerance & denture function.

2015 ICP Special Session on Geriatrics How age-related oral changes influence prosthodontics Heo, SJ
“The problem is, I’ve lived too long”

Calvin B. Ewoldsen, Sept 2015
Periodontal health courtesy of 25mg doxycycline daily, 0.12 % CHX rinse for 1 minute daily, oral irrigator, mechanical toothbrush......
“The final disease nature inflicts on us will determine the atmosphere in which we take our leave of life,” “but our own choices should be allowed, insofar as possible, to be the decisive factor in the manner of our going.”

“if the classic image of dying with dignity must be modified or even discarded, what is to be salvaged of our hope for the final memories we leave to those who love us?”

“The dignity we seek in dying must be found in the dignity with which we have lived our lives.”

Sherwin Nuland, MD
Prevalence of untreated tooth decay among US adults (CDC 2014)

- 27% of adults aged 20-64
- 20% of all adults aged 65 and older
- 36% Hispanic
- 43% non-Hispanic black
- 17% non-Hispanic Asian

Prevalence of edentulism

- 19% of adults aged 65 and older
- 38% of adults aged 75 and older

HIGHER FOR INSTITUTIONALIZED (LTC) ELDERLY!
From my perspective, NHANES dental data generously overstate the oral wellness of our nation.

How much untreated (undiagnosed) dental disease exists in US today?
ITR set-up for restorative care based on ART technique
“A procedure is considered *surgical* when it involves cutting of a patient's tissues or closure of a previously sustained wound”
Frail elderly do associate oral hygiene & retention of natural teeth but abandon both with increasing frailty until specific problems require relief. 2015 ICP Session on Geriatrics Frailty Influences Behavior & Perspectives of Elders Niesten, D
Lo EC, et al. ART & Conventional Root Restorations in Elders. J Dent Res 2006 @ 12 mos 91% vs 87%
Biofilms & Mucositis
The formation of multispecies biofilms are influenced by nature of the surface, composition of potential colonizing species & fluids that bathe the colonies  (Socransky SS. J Periodontol 2012)
### Composition

<table>
<thead>
<tr>
<th>Micro-organisms associated with dental plaque (Key pathogens)</th>
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<tbody>
<tr>
<td>Aggregatibacter actinomycetemcomitans</td>
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<tr>
<td>Porphyromonas gingivalis</td>
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<td>Prevotella intermedia</td>
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<tr>
<td>Tannerella forsythia</td>
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<td>Fusobacterium nucleatum</td>
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<td>Peptostreptococcus micros</td>
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<td>Campylobacter rectus</td>
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<th>Organic constituents</th>
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<td>Polysaccharides</td>
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<td>Proteins</td>
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<td>Glycoprotein</td>
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<td>Lipids</td>
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<th>Inorganic constituents</th>
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<td>Calcium</td>
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<td>Phosphorus</td>
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<td>Sodium</td>
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<td>Potassium</td>
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<td>Fluoride</td>
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Biofilm: Microbial Life on Surfaces

- Assemblage of microbial cells irreversibly associated (not removed by gentle rinsing) with a ‘slime’ surface in a matrix of primarily polysaccharide material. Non-cellular materials such as mineral crystals, corrosion particles, clay or silt particles, or blood components may be found in the biofilm matrix.

Donlan RM. Emerg Infect Dis, 2002 8(9) 881-890
- Multispecies biofilm = non-random cell distribution, intercellular matrix, EPS, water channels, “signaling” self-preservation.

- Bacteria interact extensively with *Candida* species with *C. albicans* + *C. glabrata, C tropicalis* (matrix formers) imparting anti-body resistance and rendering antimicrobial agents ineffective.

Pathak AK, *et al*  *Journ Appl Oral Sci* 2012  Multi-species biofilm…. on acrylic substrate
- **planktonic** organisms “nomadic” vs **sessile** organisms “attached without a foodstalk”
- intercellular matrix of inorganic substances from saliva and gingival crevicular fluid (GCF)
- exopolysaccharides (EPS) 50-95% of the dry weight = metabolic waste doubles as food source
“Mature” natural & denture biofilms have similar total numbers of bacteria, different species proportions. Post-cleaning biofilm re-development is more rapid & more complex on natural than denture teeth.

Teles, FR et al. J Periodontol 2012

Inter-cooperative collaboration, especially with Candida species renders all intraoral surfaces “biofilm susceptible”
Oral biofilms vary among individuals according to:

- HOST RESISTANCE (immune status & overall health)
- DIET
- HYGIENE & SALIVA
- ATTACHMENT OPPORTUNITIES

However, given time even cariogenic and periodontal pathogens reappear in edentulous mouths!
Felice Frankel, Nature Genetics 2005: Disease Causing Fungi (C. albicans) Avoid Detection by Changing Look
Human serum & salivary proteins promote biofilm growth, link *C. albicans* to silicone materials, influencing gene expression and virulence.

Samaranayake YH, PLoS One 2013 (8)5 e62902
Predisposing factors for *C albicans*:
- weakened immune system, HIV
- diabetes
- Sjögren's syndrome
- hormone imbalances during pregnancy, oral contraceptives
- acidic pH levels, fast foods, stress
- removable dental prostheses
- antibiotic medications

**Treatment Guidelines for Oral Candidiasis** • CID 2009:48, 525-64.
- disinfection of the denture
- mild disease, clotrimazole troches 10 mg 5 X daily, nystatin suspension 100,000 U/mL, 4–6 mL 4 X daily 7–14 days
- moderate to severe disease, oral fluconazole 100–200 mg (3 mg/kg) daily, 7–14 days,
What is the real pathogenic potential of oral biofilms in elderly patients?

- Systemic Candidiasis - mature denture biofilm, drug resistance and increasing pathogenesis

- Aspiration pneumonia – sleeping in denture doubles risk of pneumonia among very elderly (Iianuma Y, Journal Dental Research Oct 2104)
Mucositis chief complaint PAIN, XEROSTOMIA requires oral decontamination, nutritional support, trauma protection.

Tx: cryotherapy, growth factors, anti inflammatory agents [Benzydamine], Saforis, proprietary oral suspension L-glutamine, antioxidants [Amifostine], low level laser therapy.

Be careful with denture soft liners!

- leach alcohol & plasticizer
- support biofilm as leaching slows
Polymethylmethacrylate (conventional denture base resin)  
Polyurethanes (light-cure denture resins) and Silicone (chairside & lab) are readily colonized! 

NOVUS® Soft Denture Liner  
(polyphosphazene)  

www.novusliner.com
Denture trauma vs mucositis
(inflammation of the mucous membrane lining the digestive tract, especially the mouth)
Root Surface Caries (Prevention & Arrest)

• Bacterial etiology of root caries is more complex than that of coronal lesions

• Fluoride varnish and topical fluorides are effective

• Chlorhexadine (CHX) alone is less effective than fluoride

• Glycyrrhizine (Licorice Extract) lollipops appear promising

• Silverdiamine Fluoride is gaining acceptance, discoloration!
0.5 mL “clear, hard surface” varnish delivering 22,600 ppm F

Indications:
- previous caries, WSL
- demand breast feeding @ night or ad-lib prolonged bottle/sippy cup
- developmental disabilities

Contraindications:
- low caries risk
- fluoridated drinking water
- regularly receives in-office F

Advantages:
- simplified armamentarium
- not technique sensitive
- safe, patient friendly, sets on contact w/ saliva
CDT Code D01203

POI: NPO for 30 minutes, non-abrasive diet for remainder of day, delay tooth brushing until next day

TOXICITY: 5mg F/kg body weight
Cervitec Plus (CHX & thymol) 10% after 30 sec drying....less effective than SDF; less effective than F varnish

Glycyrrhizine (Licorice Extract) reduces *s mutans*


0.40% stannous fluoride 970 ppm
ACP remineralization
Ultramulsion (protective coating on oral tissues)
Spilanthes extract (herbal salivary stimulant)
No Sodium Lauryl Sulfate (SLS)
What about arresting caries? (ACT)

- Antimicrobials & remineralization promoters
  - povidone iodine
  - silver nitrate
  - silverdiaminefluoride (SDF) w/wo potassium iodide, nano SDF
  - Chlorhexadine + Thymol varnish (with fluoride)
Silverdiamine fluoride (SDF)

Two minute application, 30-40% solution, pH = 9.0 rinsed for 30 seconds


Knight GM, et al Inability to form s mutans biofilm on SFD/KI treated dentin, Quint Int. 2009: 40(2) 155-61
Dry mouth is more common among elderly than any other age group

Thomson WM, Dry Mouth & Older People
Aust Dent J 2015

Ropey or frothy unstimulated saliva = higher risk for caries
Healthy unstimulated saliva pooling in the floor of the mouth (note bubbles).
Stimulating saliva
Biotene™ (Laclede) or Dry Mouth Gel™ (GC)

Intraoral remineralization will not occur in a dry field!
3-Appointment Dentures

(impression + esthetic preview + bite + delivery)

-impressioning, bite records (MMR) & preview (templates)

-phonetic, esthetic & occlusion verification (optional wax try-in)

-delivery of finished prosthesis
GC Metal Trays (aluminum) can be adjusted slightly by bending.
Optimal clearance between tray and tissues, 2-3 mm
Center tray aligning facial midline with tray handle
After trying both maxillary & mandibular trays, capture mandibular impression

Border mold using ExaBite
Note placement of tray stops and border capture
Follow border molding with Exa Monophase
Cut or grind (relieve) interferences & tissue compression areas
Following Exa Monophase, Exa Injection will compete the capturing of tissue details.
Reminder to ‘bleed’ cartridges

ExaFast “injection” (low viscosity) fast-set VPS impression material

“Wash” impression for additional detail
Final layered impressions: ExaBite, Exa Monophase, Exa Injection (Fast set)
Invert onto base such that tray is parallel to model base.
Caution: avoid locking tray onto model base, allow peripheral excess for land area
Communicate to the laboratory the vibrating line and configuration of posterior palatal seal
Esthetic determination & preview
Rest position equals occlusal vertical dimension (OVD) plus approximately 3 mm.

Estimate occlusal vertical dimension using the sum of finger widths measured at the knuckle.

This represents the distance from nose basement at the midline to submental midline.

A “Golden Proportion”
Determine OVD & upper lip length
Construct baseplate using 2-layers all-seasons (hard, tough) baseplate wax. (Trubyte X-Hard)

Add medium soft occlusion rim (Patterson Dental)
Alma Gage measures the height and facial dimension of wax rim for recent extraction case. For aged edentulous ridges use 10 mm & 5 mm (Turbyfill)
HIP plane = occlusal plane; 10 mm from hammular notches & papilla
Non-metal RPD Materials

Nylon (Valplast, FRS)
Acetal Resin (Thermoflex, Duracetal)
Polyetheretherketone, PEEK (Juvora)
Trinia (Fiber-reinforced composite)
Naturcryl Super Hi I (press-pack, 90 min cure) with 14 Ga Co/Cr wrought wire (HR)
Flexible RPDs can simplify case planning, design and delivery……lessening the significance of undesirable undercuts
Major connector also serves as the direct retainer.

Will occlusal rests support this prosthesis, long term?
Clinical step #3

Flexible RPDs seat easily at delivery, offer adequate service life. Reline and/or repair options are possible with wise selection of materials.
Thermoflex frame with Eclipse base, bonded IPN teeth = “preferred partial”
Acetal & Acrylic @ 2 years
- Bulky, but shape-stable occlusal rests and clasps.
- Relinable, repairable bases
- Bonded artificial teeth
Clinical Evidence Supporting ART


ART restorations using highly viscous GIC survive longer than traditionally placed amalgams in young children


Single-surface ART restorations using high-viscosity glass-ionomer in both primary and permanent dentitions show high survival rates


ART should be integrated as part of clinical student training in the BDS curriculum.
Addn. ART References


