Caries management symposium

Caries management strategies: population oral health perspective

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Caries Management Strategies: Population Oral Health Perspective

Presented by
Professor Woosung Sohn
Chair of Population Oral Health
School of Dentistry
Faculty of Medicine and Health
DECAY – 100% PREVENTABLE

June 7, 2011

I spent last week in Boston for the annual meeting of an organization I belong to called the American Academy of Cosmetic Dentistry (AACD). It was a great meeting. In the four days I was there I took eight classes, went on a guided tour, and had dinner in the North End. It was great to be a “tourist” in Boston. I learned more about dental decay. I know what you are thinking, booooorrring; I did too before I took the class. I'll share some of the material I learned with you.

– Dental caries is the single most common chronic childhood disease.

– There are profound and consequential oral health disparities within the U.S. population.

- Dental cares is most common in lower SES groups, minorities, homeless and migrant populations, children with disabilities and HIV disease
- Poor children suffer twice as much dental caries as affluent children, and their disease is more likely to be untreated.
Tooth decay is the most common chronic disease in childhood
- 34.3% of 5-6 yrs experienced caries
- 27.1% of 5-10 yrs had untreated caries
- Annually, 20,000 0-9 yr old children are treated under GA
- >63,000 preventable hospitalisations annually ($8.7 billion in costs)
- Ne third of Australians delay dental care due to cost
- Some 60% of dental care is paid by individuals
Paradigm Shift

Downstream

Upstream Integrated Interventions
Strategies for Caries Prevention and Management

• Self Care
  – Personal Homecare
  – Elimination of Destructive Behaviours: Sugar, Smoking, Alcohol
  – Promote Healthy Behaviours: Healthy Diet, Exercise, Sleep, Meditate

• Community-based strategies
  – Water fluoridation
  – School-based sealants & fluorides application
  – Sugar tax

• Professional Care
  – Mechanical/chemical removal of plaque
  – Chemical (antimicrobial) modification of plaque
  – Use of fluorides
  – Salivary composition and stimulation
  – Empowering patients for self care
  – Early detection and nonrestorative intervention

<table>
<thead>
<tr>
<th>Category</th>
<th>Strategy</th>
<th>Mode</th>
<th>Caries</th>
<th>Erosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride</td>
<td>Fluoride Toothpaste</td>
<td>SC</td>
<td>++++</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>High Fluoride Toothpaste and gels</td>
<td>SC/PC</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluoride Varnish</td>
<td>PC</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Oral Hygiene</td>
<td>Tooth brushing</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flossing</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Professional Tooth Cleaning</td>
<td>PC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity reduction</td>
<td>Toothpaste</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td>Sugar Control</td>
<td>SC</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acid Control</td>
<td>SC</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Anti Bacterial</td>
<td>CHX</td>
<td>SC/PC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Triclosan</td>
<td>SC</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>SnF</td>
<td>SC</td>
<td></td>
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</tbody>
</table>
Motivational Interviewing Intervention to Address Major Risk Factors for ECC
Brief motivational interviewing intervention trial

– Randomization into two groups:
  
  – **DVD + MI (Intervention)**
    
    • DVD “*How to keep your child free from tooth decay*”
    
    • **Personal goals** for preventing tooth decay
    
    • Discussed barriers to reaching goals
    
    • Brochure with child’s picture and personalized goals

  – **DVD-only (Control)**
    
    • Same DVD
    
    • Brochure with child’s picture and standard guides

## Motivational Interviewing Intervention

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Adjusted OR*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6-months</td>
</tr>
<tr>
<td>Make sure child brushes 2 times per day</td>
<td>1.7</td>
</tr>
<tr>
<td>Make sure child brushes at bedtime</td>
<td>1.7</td>
</tr>
<tr>
<td>Check child for pre-cavities</td>
<td>3.6*</td>
</tr>
<tr>
<td>Make sure child sees DDS every 6 months</td>
<td>2.0</td>
</tr>
<tr>
<td>Provides child with non-sugared snacks</td>
<td>0.4</td>
</tr>
</tbody>
</table>

* DVD+MI group is more likely to – compared to DVD-only group, after adjusting for other variables
Motivational Interviewing Intervention

<table>
<thead>
<tr>
<th>Child Dental Outcomes (W2-W3)</th>
<th>DVD+MI</th>
<th>DVD-Only</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>New non-cavitated lesions</td>
<td>4.0</td>
<td>4.1</td>
<td>0.75</td>
</tr>
<tr>
<td>New cavitated lesions</td>
<td>2.5</td>
<td>2.3</td>
<td>0.51</td>
</tr>
<tr>
<td>New untreated lesions</td>
<td>6.5</td>
<td>6.4</td>
<td>0.87</td>
</tr>
</tbody>
</table>

Conclusions: Motivational interviewing intervention may change some reported oral health behaviors, but it failed to reduce the number of new untreated carious lesions.
Randomized Trial of Motivational Interviewing to Prevent Early Childhood Caries in Public Housing (Henshaw et al. JDR-CTR 2018)

- 1065 Boston public housing children/caregivers (61% Hispanic, 89% below poverty)
- Quarterly MI intervention for 2 years
- MI/routine prev. vs routine prev.
- *Conclusion*: MI counselling plus intensive caries prevention activities resulted in knowledge increases but did not improve oral health behaviors or caries increment
Randomized Trial of Motivational Interviewing to Prevent Early Childhood Caries in American Indian Children (Batliner et al. JDR-CTR 2018)

- 595 American Indian mother/child dyads
- 4 MI session for 36 months
- MI/ECS vs ECS

**Conclusion:** In summary, the MI intervention appeared to improve maternal knowledge but had no effect on oral health behaviors or on the progression of ECC
Oral Health Disparities Research

- **Environment**
  - clean air, water, soil, food availability, power plants, industrial waste...
- **Caregivers**
  - parenting practices, stress, employment, depression, nutrition
- **Housing**
  - quality and safety, hazards, lead...
- **Neighborhood**
  - safety, violence, play spaces..
- **Transportation**
  - quality and safety, seat belts, car seats...
- **Schools**
  - buildings, violence, quality of instruction...
- **Access to Health and Social Services**
  - medical care, dental care, immunizations, nutrition...

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The University of Sydney
What’s learned from Detroit Center

• Influences of (macro) social structural forces on oral health outcomes are clear.
  – Race/ethnicity, SES, education, access to care, material hardship, housing condition, neighborhood

• Despite economic hardship and non-healthy environment, some caregivers show resilience resulting in better oral health.

• Caregiver psychosocial factors (e.g., depression, fatalism, discrimination) play important roles in children’s ECC.
  – Influences on behavioral risk factors like toothbrushing, soda consumption, dental visits are evident.
  – Social support may provide buffering (better coping) effect under situational stressor.
Paradigm Shift: Upstream Integrated Interventions

- **Upstream vs downstream** (Watt & Sheiham 2012)
  - Health education approaches targeting lifestyle change without considering social determinants not only fail but also increase inequalities
  - Oral health programs should be integrated into other health interventions: **common risk factor approach**
- **Sick individuals and sick populations** (Rose 2001) → Healthy individuals and **healthy populations**
mHealth and caries prevention

• **Mobile text messages** success in addressing diabetes self-management, weight loss, physical activity, smoking cessation, and medication adherence

• **Health APPS**
  – Successful pilot trials in smoking cessation
  – Promising results in pilot trials for oral hygiene control in orthodontic patients
  – The need for high quality apps within oral health
  – Translation into real world settings with measurable clinical outcomes and cost-effectiveness
WHO Guidelines on free sugar intake

- Strong recommendation: Intake of free sugars <10% of total energy, and conditional recommendation of <5% for additional health benefits

Australians average 60g/day:
(equiv. 14 teaspoons white sugar)

- > half exceed guidelines
- Teenage boys highest (avg 92g /day)
- Top 10% consuming avg 160 g /day (38 teaspoons)

(ABS 2016)(Gill 2016)
Advocacy for policy toward healthy food environment

- Clear labeling laws (added sugar)
- Warning labels

- Policies to improve institutional food environments

Popova 2016

Tsai et al 2018
Sugar tax

- So far, 30 countries, 7 cities in U.S. have adopted SSB taxes
- In 2017, the WHO report:
  - Recommended SSB tax as one “best buy” policies for preventing non-communicable diseases.
  - Raise retail price by 20% or more
- Countering the regressive tax argument
  - Likelihood that effects seen more in low-income groups, thus reducing existing sugar consumption-related health disparities
  - Even greater if revenue can subsidise healthy food/drinks
- Majority Australians support (57%)

Demaio 2018
Why oral health needs to be part of the conversation

Put the mouth back into body!

LIMIT YOUR INTAKE OF ADDED SUGARS TO 6 TEASPOONS PER DAY.
Community, School-based Oral Health Promotion Strategies

- Expand water fluoridation into more communities state-wide
- Develop a program for implementing fluoride varnish programs where there is no access to water fluoridation and with a high Aboriginal populations – AMSs and LHDs
- Introduce tooth brushing programs and water coolers into all Connected Community Schools currently without access to these initiatives

Source: NSW Ministry of Health
Current model of dental care

- Dental care system still **surgically focused** rather than **preventive focused** despite long-term promotion and strong research evidence.
- **Incomplete coverage** of the population (i.e., only serving those who can afford) not only fails to address social inequalities in oral health, but contributes to these inequalities (Birch et al, 2015).
Paradigm Shift: Upstream Integrated Dental Care

• Evidence-based, cost-effective, culturally competent, prevention-focused dental care
  – Surgical care model -> chronic disease care model

• Workforce reform for oral health care (Silk, 2018)
  – New roles and responsibilities of all health team members (dental & non-dental)
  – Interprofessional approaches, education, culture
  – Reform laws & regulations

• Reform dental care delivery system (Edelstein 2018)
  – Universal coverage vs private-public dichotomy
  – Value focused vs volume focused
  – Payment innovation
Paradigm shift: ‘chronic disease care model’ ↔ ‘surgical model’

- Emphasis on whole disease process - prevention and reversing
- Aiming maintain health & preserve tooth structure
- Risk factor focused management
- Personalized dental care vs one size fits all ‘surgery’

- Cavitation-only detection (GV Black)
- Fails to recognize early signs of caries
- Underestimates the prevalence
- Unable to assess the effectiveness of preventive interventions
Effectiveness and Safety of Fluoride Varnish for Caries Prevention

Bonetti & Clarkson, Caries Research 2016

- Six Cochrane systematic reviews (200 trials, 80,000+ participants): FV applied professionally 2–4 times a year: 25–45% caries reduction in both primary and permanent teeth.
- Evidence quality is moderate: risk of bias & heterogeneity.
- Results show the consistency and magnitude of caries reductions.
- FV combined with F toothpaste appears to significantly more effective.
- Fluorosis is unlikely, if not impossible, to occur with the recommended frequency and dosage for FV.
- There was zero fluoride varnish–related adverse events.

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Country</th>
<th>Design</th>
<th>Age, #</th>
<th>FV Appl.</th>
<th>Duration</th>
<th>Prev. Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holve 2008</td>
<td>US, Native American</td>
<td>Follow up</td>
<td>9-30 mos, 357</td>
<td>Duraflor 5% NaF, 4/year</td>
<td>3 yrs</td>
<td>35% (2/yr N.S.)</td>
</tr>
<tr>
<td>Lawrence 2008</td>
<td>Canada, First Nation</td>
<td>RCT</td>
<td>6 mo-5 yrs, 952</td>
<td>Duraflor 5% NaF, 2/year</td>
<td>2 yrs</td>
<td>18%</td>
</tr>
<tr>
<td>Slade 2011</td>
<td>AUS, Aboriginal</td>
<td>RCT</td>
<td>18-47 mos, 543</td>
<td>Duraphat 5% NaF, 2/year</td>
<td>2 yrs</td>
<td>24-36%</td>
</tr>
<tr>
<td>Braun 2016</td>
<td>US, Navajo</td>
<td>RCT, CBPR</td>
<td>3-5 yrs, 897</td>
<td>3M ESPE 5% NaF, 4/year</td>
<td>3 yrs</td>
<td>Not sig.</td>
</tr>
</tbody>
</table>
Evidence-based clinical practice guideline on nonrestorative treatments for carious lesions (Slayton et al. JADA 2018)

Lesions should be monitored (for example, hardness or texture, color, radiographs) periodically throughout the course of treatment.
What are the barriers against these interventions?

• **WHY FV is underutilized?** (Bonetti and Clarkson 2016)
  - Inadequate understanding of F action mode
  - Failure to adhere current best practice guideline
  - Low reimbursement – shortage of research
  - From non-dental health workers – lack of training, time constraint

• **Threshold for surgical intervention** (Gordan et al. JADA 2010)
  - From DPBRN (AL, GA, FL, MS, MN) research involving 517 practitioner

<table>
<thead>
<tr>
<th></th>
<th>Low Risk Patients</th>
<th>High Risk Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Enamel Lesions</td>
<td>63%</td>
<td>90%</td>
</tr>
<tr>
<td>Outer Dentin Lesions</td>
<td>77%</td>
<td>94%</td>
</tr>
</tbody>
</table>

- Who are more likely to intervene surgically?
  - Dentists who did not assess caries risk
  - Solo practice or a private practice with fewer than four dentists
  - Southern region
Workforce reform

Improving the distribution and accessibility of dental practitioners and the non-registered workforce requires a more flexible approach to the utilisation of the skills of the whole workforce. This will require a focus on:

- Regulatory barriers to a flexible approach to workforce utilisation
- Providing support and incentivising dental practitioners to work in regional and remote areas and with Priority Populations
- Educational and training outcomes which reflect skills and competencies relevant to Priority Population needs
- New and emerging technologies can be used to improve accessibility for Priority Populations (e.g. telehealth)
- Innovative partnership models between the public, non-government and private sectors and regional and remote communities to create opportunities for broader service distribution
Key Recommendations:

1. Support for the development of a National FV Framework with a standardized protocol, training and targeting of schools/preschool (in the first instance)

2. Development of a AHMAC Submission seeking support for the National FV Framework and also standardized legislation regarding non-registered dental/medical personnel applying FV

3. Certificate III in Dental Assisting with Apply Fluoride Varnish module is the supported level of training with flexibility to include (para professional) Health Workers
How many dentists are needed in 2040? (Eklund and Bailit JDE 2017)

1. Population growth & demographic change
2. Dental disease and utilization
   - Healthier generations, low utilization & expenditure
   - Disparities in vulnerable populations
3. Dental delivery system transformation
   - Universal coverage
   - Innovative payment system
   - Value-based rather than volume-based
   - Solo -> group, corporate; integration to primary care
   - New technologies
4. Workforce transformation
   - Expanded scope of allied dental workforce
   - Non-dental health workers
   - Impact for dental education
Paradigm Shift: Upstream Integrated Caries Management

- Improve the oral health through primary prevention
- Improve access to oral health services
- Reduce disparities in the oral health status
"The day is surely coming... when we will be engaged in practicing preventive rather than reparative dentistry"

Dr. G.V. Black (1836-1915)  
“The Father of Modern Dentistry”
Any Questions?

Thank you!

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