Contemporary Policy Implications to Control and Prevent Dental Caries

Policies are formed to achieve outcomes? Are outcomes being achieved?
do not follow where the path may lead
go instead where there is no path
AND LEAVE A TRAIL
“Whatever course you decide upon, there is always someone to tell you that you are wrong. There are always difficulties arising which tempt you to believe that your critics are right. To map out a course of action and follow it to an end requires . . . COURAGE.”

— Ralph Waldo Emerson
“If I’d asked people what they wanted they’d have said faster horses”
– Henry Ford
Temple University School of Dentistry’s Mission is the Transformation of Oral Health

*Established 1863-Present*
The Kornberg School of Dentistry promotes health through the education of diverse general and specialty dentists; provides comprehensive, patient-centered, evidence-based and outcome-driven oral health care; and, engages in research, scholarly activities and community service.

Transforming Oral Health
Agenda

1. Outcome-focused dental care
2. Dental caries?
3. Redefining dentistry and public health
4. Outcomes-focused caries management
Outcome-focused dental care

Dental caries?

Redefining dentistry and public health

Outcomes-focused caries management
The Value of Any Healthcare System is to Promote Health either by Eradicating Diseases or Reducing their Severity so they can be Self-managed

Restoration of teeth is a failure
Outcomes

Value-driven by preferences of patients, society, and policy makers
Expenditures on Health Care as a Percentage of Gross Domestic Product (GDP)

The World Bank, September 1, 2012
If we all agree that health is our ultimate outcome then we need to develop integrated models of care using the best approaches to achieve the goal. Coalitions of Oral Health Must open new paths.
### Current

- Drill and fill programs have not resolved the caries problem
- Limited focus on periodontal diseases
- Oral cancer is sporadically managed and too late in the disease process
- Craze for implants
  - Sometimes in infected sites
Dental Care Systems

<table>
<thead>
<tr>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Fluoride and sealant placement programs have not eliminated the caries problem</td>
</tr>
<tr>
<td>▪ We need system thinking and not “majic bullets”</td>
</tr>
<tr>
<td>▪ Think and act differently</td>
</tr>
</tbody>
</table>
Dentists own the Disease Treatment Model
The Health and Wellness Model is Still Unclaimed
The Business of Health!
What is the Future of Dental/ Oral/ Healthcare?

Change in demographics
Demand for better and efficient
Value for care
Time, Time, Time
Preservation of health (tooth preservation)
Information power is tipped towards patients and customers
Dispersion of power
Globalization
Competition....
Integrated care models

Patient-centered
Community-focused
Comprehensive care
Teams
Maximum limit of scope of practice OR
Change the scope of practice
Technology

Reduce cost and improve outcomes
Digital dentistry
Lasers
No handpieces
Demographic and Financial Imperatives
## Elderly US Population will Increase by 31 Million between 2010 and 2030

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2010</th>
<th>2030</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total US Population</td>
<td>308,745,548</td>
<td>373,504,000</td>
<td>64,758,452</td>
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<tr>
<td>65 to 69 years</td>
<td>12,435,263</td>
<td>20,393,318</td>
<td>7,958,055</td>
</tr>
<tr>
<td>70 to 74 years</td>
<td>9,278,166</td>
<td>18,413,747</td>
<td>9,135,581</td>
</tr>
<tr>
<td>75 to 79 years</td>
<td>7,317,795</td>
<td>14,379,904</td>
<td>7,062,109</td>
</tr>
<tr>
<td>80 to 84 years</td>
<td>5,743,327</td>
<td>10,159,309</td>
<td>4,415,982</td>
</tr>
<tr>
<td>85 years and over</td>
<td>5,493,433</td>
<td>8,744,986</td>
<td>3,251,553</td>
</tr>
<tr>
<td>Total 65+</td>
<td>40,267,984</td>
<td>72,091,264</td>
<td>31,823,280</td>
</tr>
</tbody>
</table>
Population Growth in India

India 2016

Population: 1,326,801,000

India 2030

Population: 1,527,657,000
Immigrants contribute Over 80% of the Growth in the US Population

In the United States, immigration is the difference between a stabilizing population and a skyrocketing one.

- Projected Population WITH Immigration
- Projected Population WITHOUT Immigration
# US Population by Poverty Level in 2010

<table>
<thead>
<tr>
<th>Poverty Level</th>
<th>Under 100%</th>
<th>100-199%</th>
<th>200-399%</th>
<th>400%+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>15%</td>
<td>19%</td>
<td>30%</td>
<td>36%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>45,748,400</td>
<td>60,705,600</td>
<td>93,880,700</td>
<td>113,060,800</td>
<td>313,395,400</td>
</tr>
</tbody>
</table>

### POVERTY: 1959 TO 2010

**Numbers in millions, rates in percent**

- **Number in poverty**: 46.2 million
- **Poverty rate**: 15.1 percent

### PERCENTAGE OF CHILDREN IN POVERTY BY RACE AND HISPANIC ORIGIN: 2013

- **National Average**: 22%
- **African American**: 39%
- **American Indian**: 37%
- **Asian and Pacific Islander**: 14%
- **Hispanic**: 33%
- **Non-Hispanic White**: 14%
- **Two or More Races**: 23%

*Source: U.S. Census Bureau*
1. Outcome-focused dental care
2. Dental caries?
3. Redefining dentistry and public health
4. Outcomes-focused caries management
Dental Caries is a Complex Dynamic Disease Caused by behavioral, Social, and Biological Factors Influencing the Oral Microbiome

The focus now and the future is on the oral microbiome
The Decayed, Missing, and Filled Teeth/Surfaces Index

Measure of Current and Past Disease Outcomes?
Dental Caries
Destruction of Hard Dental Tissues

• Dental caries is the localized destruction of susceptible dental hard tissues by acidic by-products from bacterial fermentation of dietary carbohydrates.

• The very early changes in the enamel are not detected with traditional clinical and radiographic methods.

• Dental caries is a chronic disease that progresses slowly in most people.
Caries Definition: Microbiome Ecology

• Dental caries is a multifactorial disease that starts with microbiological shifts within the complex microbiome and is affected by salivary flow and composition, exposure to fluoride, consumption of dietary sugars, and by patients’ oral hygiene behaviors.
The Human Microbiome is Necessary for Health

100 trillion bacteria of several hundred species bearing 3 million non-human genes. ...humans are not single organisms, but super-organisms made up of lots of smaller organisms working together.
Over 3,600 Types of Bacteria in Saliva and 6,500 in Dental Plaque

- In the mouth, there are at least **3,621 species-level** phylotypes (genomically unique) in saliva and **6,888** phylotypes in plaque, (JDR 2008:1016-20)

- The dental community has focused on less than 10 of these bacterial types

Kolenbrander et al. (2002)
Bacteria live under nutrient limitations and are dormant.

Resistance to antimicrobials is high because of the dormant state of the bacterial cells.

Kolenbrander et al. (2002)
Children Delivery Method Affects Acquisition of S. Mutans

› On average children born via Cesarean section acquired S. Mutans 11.7 months earlier than children born via vaginal delivery.
Proportional representation of the microbiome by caries status.

Higher representation of non-cariogenic bacteria on sound tooth surfaces.
Cariogenic Bacteria

Aciduric
Acidogenic

- *Streptococcus sanguinis*
- *Treponema species*
- *Capnocytophaga sputigena*
- *Anginosus group 3*
- *Fusobacteria species 4*
- *Streptococcus gordonii*
- *Fusobacteria species 1*
- *Gemella morbillorum*
- *Streptococcus mitis*
- *Propionibacterium acidifaciens*
- *Streptococcus mutans 1*
Dental Caries is an Endogenous Infection?
Dental Caries Can be Reversed or Stopped

• The disease is initially reversible and can be halted at any stage, even when dentin or enamel are cavitated.
01. Staging disease

02. Risk assessment

03. Comprehensive plan
- Prevent, control, minimally intervention, follow-up

04. Outcomes
- Self-care, disease control, new lesions
Dental Public Health is Part of Dental Care and Vice Versa
The Decayed, Missing, and Filled Teeth/Surfaces Index

Reprinted from Espelid et al, 1997 with permission
Mean Number of Decayed Surfaces per American in 1999-2004.

<table>
<thead>
<tr>
<th>Family Income (% FPL)</th>
<th>Age Groups (Years)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12-18*</td>
<td>19-44*</td>
<td>45-64 *</td>
<td>65-74*</td>
<td></td>
</tr>
<tr>
<td>&lt;100%</td>
<td>0.8 (0.1)</td>
<td>2.4 (0.2)</td>
<td>2.9 (0.4)</td>
<td>1.7 (0.4)</td>
<td></td>
</tr>
<tr>
<td>100 to 200%</td>
<td>0.8 (0.1)</td>
<td>2.2 (0.2)</td>
<td>2.0 (0.3)</td>
<td>1.4 (0.3)</td>
<td></td>
</tr>
<tr>
<td>&gt;200 to 300%</td>
<td>0.6 (0.1)</td>
<td>1.4 (0.1)</td>
<td>1.6 (0.2)</td>
<td>0.9 (0.2)</td>
<td></td>
</tr>
<tr>
<td>&gt;300% to 400%</td>
<td>0.2 (0.1)</td>
<td>1.3 (0.2)</td>
<td>1.0 (0.2)</td>
<td>0.5 (0.1)</td>
<td></td>
</tr>
<tr>
<td>&gt;400%</td>
<td>0.2 (0.1)</td>
<td>0.5 (0.1)</td>
<td>0.4 (0.1)</td>
<td>0.2 (0.05)</td>
<td></td>
</tr>
</tbody>
</table>

*Differences between lowest and highest income groups are statistically significant, p<0.001.*
Mean Number of Filled Surfaces per American in 1999-2004.

<table>
<thead>
<tr>
<th>Family Income (% FPL)</th>
<th>Age Groups (Years)</th>
<th>12-18</th>
<th>19-44*</th>
<th>45-64*</th>
<th>65-74*</th>
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</thead>
<tbody>
<tr>
<td>&lt;100%</td>
<td></td>
<td>3.4</td>
<td>7.8</td>
<td>13.1</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.3)</td>
<td>(0.4)</td>
<td>(1.2)</td>
<td>(1.2)</td>
</tr>
<tr>
<td>100 to 200%</td>
<td></td>
<td>3.1</td>
<td>9.8</td>
<td>15.1</td>
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<tr>
<td></td>
<td></td>
<td>(0.2)</td>
<td>(0.5)</td>
<td>(1.0)</td>
<td>(2.1)</td>
</tr>
<tr>
<td>&gt;200 to 300%</td>
<td></td>
<td>2.8</td>
<td>12.1</td>
<td>20.8</td>
<td>31.3</td>
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<tr>
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<td>(0.2)</td>
<td>(0.9)</td>
<td>(1.3)</td>
<td>(2.1)</td>
</tr>
<tr>
<td>&gt;300% to 400%</td>
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<td>2.8</td>
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<td>27.0</td>
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<tr>
<td></td>
<td></td>
<td>(0.3)</td>
<td>(0.5)</td>
<td>(1.2)</td>
<td>(2.2)</td>
</tr>
<tr>
<td>&gt;400%</td>
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<td>2.6</td>
<td>15.0</td>
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<td>39.1</td>
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<td></td>
<td></td>
<td>(0.2)</td>
<td>(0.5)</td>
<td>(0.8)</td>
<td>(1.4)</td>
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</tbody>
</table>

*Differences between lowest and highest income groups are statistically significant, p<0.001.
Mean Number of Missing Tooth Surfaces per American in 1999-2004.

<table>
<thead>
<tr>
<th>Family Income (% FPL)</th>
<th>Age Groups (Years)</th>
<th>12-18</th>
<th>19-44*</th>
<th>45-64*</th>
<th>65-74*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100%</td>
<td></td>
<td>2.1</td>
<td>3.2</td>
<td>5.6</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2)</td>
<td>(0.1)</td>
<td>(0.2)</td>
<td>(0.6)</td>
</tr>
<tr>
<td>100 to 200%</td>
<td></td>
<td>1.9</td>
<td>3.1</td>
<td>5.2</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2)</td>
<td>(0.2)</td>
<td>(0.2)</td>
<td>(0.4)</td>
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<td>3.1</td>
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<td>4.0</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>(0.3)</td>
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<td>3.9</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.3)</td>
<td>(0.2)</td>
<td>(0.2)</td>
<td>(0.4)</td>
</tr>
<tr>
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<td>2.6</td>
<td>2.8</td>
<td>3.1</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2)</td>
<td>(0.1)</td>
<td>(0.1)</td>
<td>(0.2)</td>
</tr>
</tbody>
</table>

*Differences between lowest and highest income groups are statistically significant, p<0.001.
Agenda

1. Outcome-focused dental care
2. Dental caries?
3. Redefining dentistry and public health
4. Outcomes-focused caries management
Reframe, redefine

Dental practice is being reframed by market forces
Focus on Dental/Oral Health
Prevent new disease
Preserve tooth structure and periodontal/mucosal tissues
New integrated model of dental practice and public health
Change the way we define and measure dental caries
Workforce

We do not need more dentists
We need more dental teams
Rethinking dentist shortages

Figure. Percentage of general and specialist dentists who report they are not busy enough and could see more patients, 2013. Source: American Dental Association Health Policy Institute Survey of Dental Practice.
Dental Public Health Re-defined

- Dental public health is a scientifically-based specialty of dentistry and public health that integrates knowledge and experiences from dental, behavioral, public health, educational and political sciences, with experiences from business, management, marketing, and advocacy, to promote health and oral health and provide primary, secondary, and tertiary dental care for individuals and populations.
Dentistry Re-defined

- Dentistry is a scientifically-based health promotion discipline that integrates knowledge and experiences from dental, behavioral, public health, educational and political sciences, with experiences from business, management, marketing, and advocacy, to promote health and oral health and provide primary, secondary, and tertiary dental care for individuals and populations.
Comprehensive Dental Care and Public Health Model

S.O.A.P. = Subjective, Objective, Assessment (Synthesis) and Planning

Comprehensive Patient Care Plan

Assessment and Synthesis (3rd (A))

Synthesis of Subjective and Objective Clinical Data

<table>
<thead>
<tr>
<th>Subjective Interview</th>
<th>Objective Clinical Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk factors, medical and dental history and current problems, preferences for outcomes</td>
<td></td>
</tr>
<tr>
<td>Disease classification, risk factors, assessment of full oral health complex, social-behavioral status</td>
<td></td>
</tr>
</tbody>
</table>

1st (S)  2nd (O)

Diagnosis

Disease diagnosis based on clinical and radiographic data

Control of early disease states

Surgical endodontic, restorative or rehabilitative care

Risk Management

Review, Monitor (Recall)

Prevention plan

Treatment planning

Outcomes
Agenda

1. Outcome-focused dental care
2. Dental caries?
3. Redefining dentistry and public health
4. Outcomes-focused caries management
International Caries Classification and Management System (ICCMS)
Mission of the International Caries Classification and Management System (ICCMS)

*Preserve dental tissues first and restore only when indicated*
The following documents have been made available for download from this site:

ICCMSTM Quick Reference Guide, Guía de referencia rápida ICCMSSTM para clínicos y educadores - Español

ICCMSTM Guide, Guía ICCMSSTM para clínicos y educadores - Español
Clinical Caries Management

1. Intuitive decisions on restorative care (e.g. Class II)
2. Restore
3. Classify: 2 or 3 stages
4. Assess risk factors
5. Analyze and diagnose
6. Manage
Clinical and Radiographic Examinations

Clinical staging

Radiographic staging
ICCMS: Initial Caries Lesions (Pits and Fissures)
ICCMS: Initial Caries Lesions (Smooth Surfaces)
ICCMS: Moderate Caries Lesions (P&F)
ICCMS: Extensive Caries Lesions
Initial (Non-cavitated) and Manifest (Cavitated) Caries

- Initial caries: loss of surface translucency
- Manifest caries: cavitation

To Control Caries in Populations We Should Focus on Sound and Initial Lesions

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Initial</th>
<th>Moderate</th>
<th>Extensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound</td>
<td>13,978</td>
<td>978</td>
<td>126</td>
</tr>
<tr>
<td>Initial</td>
<td>865</td>
<td>87</td>
<td>73</td>
</tr>
<tr>
<td>Moderate</td>
<td>206</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Detroit, 2002-05
Staging the carious process – Radiographic examination: USA

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>No Radiolucency</td>
</tr>
<tr>
<td>0</td>
<td>Sound</td>
</tr>
<tr>
<td>RA</td>
<td>Initial stages</td>
</tr>
<tr>
<td>1</td>
<td>Radiolucency outer ½ enamel</td>
</tr>
<tr>
<td>2</td>
<td>Radiolucency inner ½ enamel +/- EDJ</td>
</tr>
<tr>
<td>RB</td>
<td>Moderate stages</td>
</tr>
<tr>
<td>3</td>
<td>Radiolucency outer 1/3 dentine</td>
</tr>
<tr>
<td>4</td>
<td>Radiolucency middle 1/3 dentine</td>
</tr>
<tr>
<td>RC</td>
<td>Extensive stages</td>
</tr>
<tr>
<td>5</td>
<td>Radiolucency inner 1/3 dentine</td>
</tr>
<tr>
<td>6</td>
<td>Radiolucency into pulp</td>
</tr>
</tbody>
</table>
ICCMS Defines 6 Stages of Radiographic Caries
ICCMS Defines 6 Stages of Radiographic Caries
ICCMS Defines 6 Stages of Radiographic Caries
<table>
<thead>
<tr>
<th>ICCMS™ Categories (C)</th>
<th>$R_0$</th>
<th>$RA_{1-2}$</th>
<th>$RA_3$</th>
<th>$RB$</th>
<th>$RC$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_{\text{Sound}}$</td>
<td>Sound$_{\text{CR}}$</td>
<td>Initial$_{\text{CR}}$</td>
<td>Initial$_{\text{CR}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
</tr>
<tr>
<td>$C_{\text{Initial}}$</td>
<td>Initial$_{\text{CR}}$</td>
<td>Initial$_{\text{CR}}$</td>
<td>Initial$<em>{\text{CR}}$ or Moderate$</em>{\text{CR}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
</tr>
<tr>
<td>$C_{\text{Moderate}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Moderate$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
</tr>
<tr>
<td>$C_{\text{Extensive}}$</td>
<td>Extensive$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
<td>Extensive$_{\text{CR}}$</td>
</tr>
</tbody>
</table>
Assessing Caries Activity is Necessary for Making Appropriate Management Decisions
## Active Caries Lesions

<table>
<thead>
<tr>
<th>Features</th>
<th>Active</th>
<th>Non-Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque stagnation area</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Whitish/yellowish; opaque with loss of luster</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Enamel surface feels rough</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Covered by thick plaque</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cavity feels soft or leathery</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
ICCMS Defines 4 Stages for Root Caries

Root Caries Staging and Activity Classification

Exposed root surface?
- No
- Yes

After 5 second of air drying, is there a color change seen (discoloration, light-brown, dark brown, black)
- No
- Yes

Is cavitation present? (loss of anatomical contour (0.5 mm))
- No
- Yes

For root caries lesions (Codes 1 and 2), what is the texture and appearance at the base of the discolored area?
- Smooth, Shiny
- Hard
- ARRESTED
- Rough and Matted
- Soft or leathery
- ACTIVE

0 = No Caries
1 = Non-cavititated
2 = Cavitated
Clinically Non-cavitated Stage
# Diagnosis

Decision matrix for staging of caries and potential treatment options

<table>
<thead>
<tr>
<th>ICCMS™ combined Categories</th>
<th>Activity status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active lesions</td>
</tr>
<tr>
<td>ICCMS™ Sound</td>
<td>No lesion</td>
</tr>
<tr>
<td>ICCMS™ Initial</td>
<td>Initial Active</td>
</tr>
<tr>
<td>ICCMS™ Moderate</td>
<td>Moderate Active</td>
</tr>
<tr>
<td>ICCMS™ Extensive</td>
<td>Extensive Active</td>
</tr>
</tbody>
</table>

Table 6. ICCMS™ caries diagnosis (staging and activity status per lesion).
Caries Risk Status

Patient’s level risk factors
- Head & neck radiation
- Current hypo-salivation
- Oral hygiene practices
- Topical fluoride exposure
- Sugary drinks & snacks
- Dental attendance
- Social-economical status
- Mothers’ caries experience

Intraoral level risk factors
- Active caries lesions
- Dry mouth
- PUFA
- Caries experience
- Thick plaque
- Exposed root surfaces
- Appliances
Risk-Adjusted Prevention of Dental Caries

Risk-based Preventive Care

- **High**: Intensive home and clinical preventive care, frequent reviews and recalls.
- **Moderate**: Clinical and home preventive care, frequent reviews and recalls.
- **Low**: Home preventive care and long-term recall.
The following documents have been made available for download from this site.

ICCMS™ Quick Reference Guide: Guía de referencia rápida ICCMS™ para clínicos y educadores - Español

ICCMS™ Guide: Guía ICCMS™ para clínicos y educadores - Español
**Low Likelihood**

- Tooth brushing 2/day with a fluoride toothpaste (≥ 1,000 ppm F), following the dental team instructions *(SIGN 1++; GRADE A)*

**Moderate Likelihood**

- Tooth brushing 2/day with a higher efficacy fluoride toothpaste (≥ 1,450 ppm F), or High F prescription toothpaste *(SIGN 1++; GRADE B)* following the dental team instructions
- General Behavior Modification in Oral Health *(SIGN 1++; GRADE A)*
- Prescribed F mouthrinse *(SIGN 1++; GRADE A)*
- Motivational engagement (discuss with patients how to improve oral health behaviors - including amount of sugar), maintain dental visits at risk-based intervals *(SIGN 3; GRADE D)*
- Sealants *(SIGN 1++; GRADE A)*
- F varnish 2 times/year *(SIGN 1++; GRADE B)*
- F gels or solution (2% NaF) *(SIGN 1++; GRADE A)*
- Recalls up to every 3 months: professional cleaning & topical F application on active lesions. *(SIGN 2++; GRADE B)*
- Motivational interviewing *(SIGN 1++; GRADE A)*
- One-to-one dietary intake interventions *(SIGN 1++; GRADE B)*
- Altering medication-induced hyposalivation *(SIGN 3; GRADE D)*
- Reducing the use of recreational drugs *(SIGN 3; GRADE D)*
- Increase F varnish to 4 times/year *(SIGN 1++; GRADE B)*
- Topical F application, counseling: reduce sugar amount & frequency *(SIGN 1++; GRADE A)*

**High Likelihood**
Comprehensive Management Plan

Prevent, Adjusted to Risk
- Caries on sound tooth surfaces

Control
- Initial caries lesions

Minimally Restore
- Moderate and extensive lesions

Review and Monitor
- Tailored to risk status

Outcomes
Figure 1—(A) Minor decay isolated to the pit areas on a maxillary molar. (B) Typical amalgam restoration removing the entire groove. (C) Preventive resin restoration, removing decay from the pits and sealing the remaining groove structure (adapted from Ripa, LW and Wolff MS, 1992).

Minimal Cavity Preparation

Figure 3A—Decay is exposed and excavated. Facial and lingual walls may not require removal depending on the extension of the caries.

Figure 3B—Tooth is restored with composite and the occlusal surface is sealed.

Outcomes

- Is the quality of care satisfactory?
- Has the quality of life of the patient improved?
- Is the disease controlled?
- Can the patient maintain his or her health?
Caries Management System (CMS) Clinical Trial

- Evans R, Clark P, Jia N. Caries Management System.
- Clinical trial in 19 practices
- Randomized into CMS protocol and current standard of care used in the practice
- CMS
  - Risk reduction
    - Education
    - Behavioral interventions
    - Dietary modification
    - Fluoride
    - Sealants
  - Management of non-cavitated caries
    - Sealants
    - Fluoride
- Overall reduction after 7 years in DMFT increments was around 33% between the CMS and comparison practices
Dental Caries Management

**Health Promotion**
- Self-care at home: marketing and education
- Simple and effective preventive products
- Integration of community outreach with health and dental care

**Dental Education/Practice**
- Comprehensive
- Diagnostic and treatment codes
- Team managed and outcomes driven

**Workforce**
- Teams
- Focused on outcomes
- Dentists’ competencies and role must change
My Predictions

- Tests will be available to map out the microbiome and people can evaluate their shifts towards disease and start therapies at home.
- Dental caries prevention will start during the first 2 days of life.
- Tests for early carious lesions will be available over the counter and patients can start remineralization therapies using over the counter medications.
- Dentists will be reimbursed based upon health outcomes rather than procedures.
- Critical health information will be available to patients and the public all the times.
The day is surely coming ... when we will be engaged in preventive rather than reparative dentistry. When we will so understand the etiology and pathology of dental caries that we will be able to combat its destructive effect by systemic medication.