Development and Use of AAPD’s Caries-Risk Assessment Tool (CAT)

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Presentation Overview

- Rationale for caries-risk assessment tools
- Development of AAPD Caries-risk Assessment Tool ("CAT-v1.0")
- Experience using CAT
  - Feasibility testing
    - Practice settings
    - Educational settings
- Next steps
"Caries Risk" is a term to indicate what will happen in the future - will there be demineralizations, will new cavities occur?

It is understood that the evaluation is made for a certain period of time, for example for the coming year.

* - Department of Cariology, Malmö University
http://www.db.od.mah.se/car/data/riskprincip.html
Responding to Changing Paradigms for Dealing with Dental Caries

- **Old Paradigm** --> Surgical / ‘Drill and Fill’
  (deal with the consequences of the disease)

- **Later Paradigm**: Prevention!!!
  (but generally “one size fits all”)

- **“Current” Paradigm**: Early Intervention, Risk Assessment, Anticipatory Guidance, Individualized Prevention and Disease Management
  (why this approach?)
Population Considerations
Percent of U.S. Children with Clinical Evidence of Decay by Age
Dental Caries in California’s School Children: 2005

- 54% by Kindergarten
- 71% by 3rd Grade
Percent of Children with Decayed and Filled Primary Teeth by Household Income Level (% of Federal Poverty Level)
‘Minority children’ are more likely to have untreated tooth decay (regardless of family income)
Caries - An infectious, transmissible disease; but also a chronic, complex disease.

By appreciating that dental caries belongs to the group of common diseases considered as ‘complex’ or ‘mulifactoral’ such as cancer, heart diseases, diabetes, and certain psychiatric illnesses, we have to realise that there is no simple causation pathway. It is not a simplistic problem such as ‘elimination of one type of microorganism’, or a matter of improving ‘tooth resistance’. Complex diseases cannot be ascribed to mutations in a single gene or to a single environmental factor. Rather they arise from the concerted action of many genes, environmental factors, and risk-conerring behaviours. As stressed recently by Fejerskov O. Changing paradigms in concepts on dental caries: consequences for oral health care. Caries Res 2004; 38:182-91.

Let us keep in mind that dental caries is ubiquitous in all populations [Fejerskov and Baelum, 1998], but the incidence rate varies greatly within and between populations. It is important to appreciate that the caries incidence rate in a group of individuals appears fairly constant throughout life if no special efforts to control lesion progression are made [Hand et al., 1988; Luan et al., 2000]. These new paradigms help to explain the nature of lesion initiation and progression and accordingly why dental caries cannot truly be ‘prevented’, but rather ‘controlled’ by a multitude of interventions.

At the individual patient level we have successfully ‘controlled’ the physiologic balance of the intra-oral environment with topical fluorides, dietary monitoring, ‘plaque control’, etc., but the well-trained clinician knows that some patients require much more and ‘closer’ monitoring than others to avoid new lesions. The consequence of the paradigms is to appreciate that the risk of developing new lesions is never zero. Therefore dental caries can never be 100% preventable at the individual and much less at the societal level because of its complex nature. Dental caries is as old as mankind.
Caries Balance → chronic, dynamic disease

Balance between Risk Factors & Protective Factors

**Risk factors:**
- Promote demineralization
  - Frequent exposure to refined sugars
  - Cariogenic bacteria (S. mutans)
  - Reduced salivary flow

**Protective factors:**
- Promote remineralization
  - Fluorides
  - Plaque control
  - Saliva
  - Antimicrobials

Adapted from Featherstone JDB: JADA 131:887-99, 2000
Dental Caries: Advanced Clinical Stages

(Early Childhood Caries – ECC)

Moderate

Severe
DIAGRAMATIC REPRESENTATION OF A MODEL SYSTEM

PERIODIC ASSESSMENTS

- RISK LEVEL (low, high)
- DISEASE STATUS (none, initial, advanced)
- NEED FOR TREATMENT (urgent, basic, advanced)

- No Lesions
  - Low Risk
    - Counseling to maintain low risk
    - Anticipatory Guidance
    - Primary prevention (e.g., fluoride, sealants)
    - Recommend ‘dental home’
    - Reassess in 12 mos.
    - Data Entry

- No Lesions
  - High Risk
    - Risk management program to reduce risk
    - Anticipatory Guidance
    - Primary Prevention
    - Refer to dental home
    - Reassess in 6 mo
    - Data Entry

- Initial Lesions Only
  - Refer to dentist for diagnosis to verify initial disease status
    - Anticipatory Guidance
    - Initial disease mgt. program to control disease and reduce risk
    - Anticipatory Guidance
    - Reassess in 3-6 months based on risk level
    - Data Entry

- Advanced Lesions
  - Refer to dentist to develop & implement reparative treatment plan
    - Advanced disease mgt. program to control disease and reduce risk
    - Anticipatory Guidance
    - Reassess in 3-6 months based on risk level
    - Data Entry

Risk-based Management of Initial Carious Lesions

Low caries-risk patients
- Counseling & Anticipatory Guidance
- Fluorides
- Fissure Sealants

High caries-risk patients
- Recall appointments extended over time
- More frequent recall appointments tailored to risk/progression of disease
- Fluoride products
- Sealant on fissures (when indicated)
- Chlorhexidine / Xylitol / Antimicrobials

S. mutans count
- Low: -
- High: +

Disease progression
- Low: -
- High: +
Development of AAPD’s Caries-risk Assessment Tool
AAPD Caries-risk Assessment Tool (CAT)

- Parameters:
  - Intended for use by dentists and other health care providers
  - Amenable to use in varied settings
    - Radiographs optional
    - Microbiologic testing optional
Process

- “Expert Panel #1”:
  - Literature review
  - Identification of risk factors
  - Instrument structure
  - Weighting of factors?
  - Thresholds for categories? / Scoring?

- “Expert Panel #2”:
  - Content
  - Format
## AAPD Caries-Risk Assessment Tool (CAT)

### Clinical Conditions
- No decayed teeth in past 24 months
- No enamel demineralization (enamel caries “white-spot lesions”)
- No visible plaque; no gingivitis
- Gingivitis

### Environmental Characteristics
- Optimal systemic and topical fluoride exposure
- Consumption of simple sugars or foods strongly associated with caries initiation primarily at mealtimes
- High caregiver socioeconomic status
- Regular use of dental care in an established Dental Home
- Suboptimal systemic fluoride exposure with optimal topical exposure
- Occasional (e.g., 1-2) between-meal exposures to simple sugars or foods strongly associated with caries
- Mid-level caregiver socioeconomic status (e.g., eligible for school lunch program or SCHIP)
- Irregular use of dental services
- Suboptimal topical fluoride exposure
- Frequent (e.g., 3 or more) between-meal exposures to simple sugars or foods strongly associated with caries
- Low-level caregiver socioeconomic status (e.g., eligible for Medicaid)
- No usual source of dental care
- Active decay present in the mother of a preschool child
- Children with special health care needs
- Conditions impairing saliva composition/flow

### General Health Conditions

### AAPD Caries-Risk Assessment Tool

- Low Risk
- Moderate Risk
- High Risk

AAPD CAT Feasibility Testing

- **Pediatric Dental Practice** *(AAPD, unpublished test results)*
  - Practical for use in clinical practice
  - Clinical support staff found it useful for differentiating patients and educating patients

- **Clinical Dental Education** *(Nainar & Straffon, J Dent Educ, 2006;70:292-295.)*
  - Most students agreed that the CAT instrument was easy to understand (86 percent), simple to apply (76 percent), useful for prescribing radiographs (76 percent), and useful for determining preventive procedures (84 percent).
  - 80% of students indicated that they were likely to use the CAT instrument in their clinical practice.
Other Reactions:
Inexperienced ‘Non-Dental Personnel’

WHY DOES EVERYTHING HAVE TO BE SO COMPLICATED?!
RESULTS: Among 45,693 individuals in the two plans, those categorized as being at high caries risk were approximately four times as likely to receive any caries-related treatment as those categorized as being at low caries risk. Those categorized as at moderate risk were approximately twice as likely to receive any treatment. In addition, for those at elevated risk who required any treatment, the number of teeth requiring treatment was larger. CONCLUSION: The results of this study provide the first large-scale, generalizable evidence for the validity of dentists' subjective assessment of caries risk. (Bader J, et al. J Public Health Dent 2005;65(2):76-81.)
AAPD CAT – Next Steps???

- Formatting to facilitate data collection
- Field testing and data analysis
  - Predictive values in different populations
- Refinement based on data analysis
Summary / Conclusions

- **Growing emphasis on caries-risk assessment**
  - Identification of at-risk children before lesions reach the stage where they need to be restored
  - Basis for targeted prevention/caries-control strategies

- **Multiple instruments have been developed**
  - Largely based on factors identified in the literature
  - Largely untested

- **Appropriate testing is critical to assess instruments’ performance across different populations and make refinements**