

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 – v 1.0”)
- Experience using CAT
 - Feasibility testing
 - Practice settings
 - Educational settings
- Next steps

Caries Risk*

- "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)



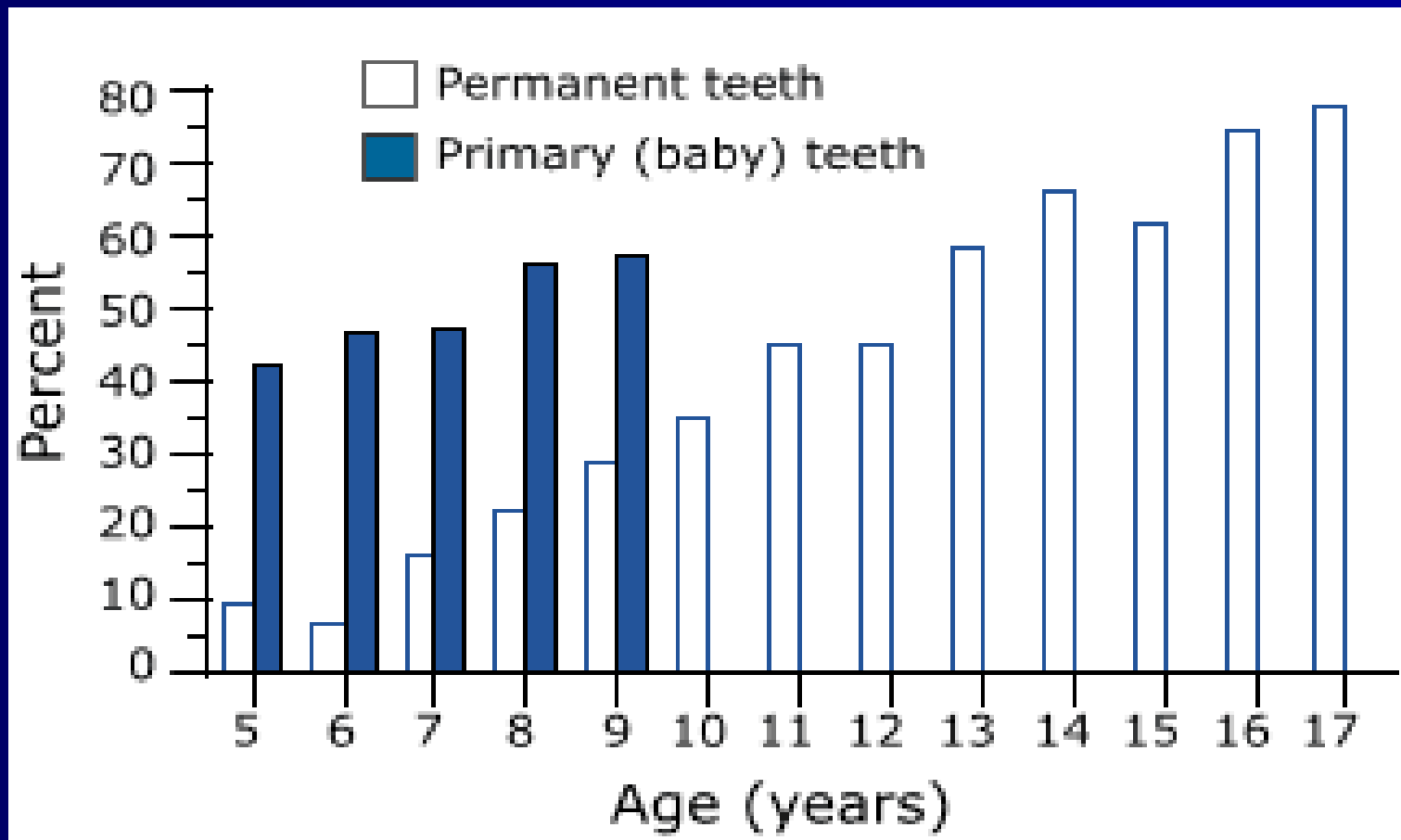
- Later Paradigm: Prevention!!!
(but generally “one size fits all”)



- “Current” Paradigm: Early Intervention, Risk Assessment, Anticipatory Guidance, Individualized Prevention and Disease Management
(why this approach?)

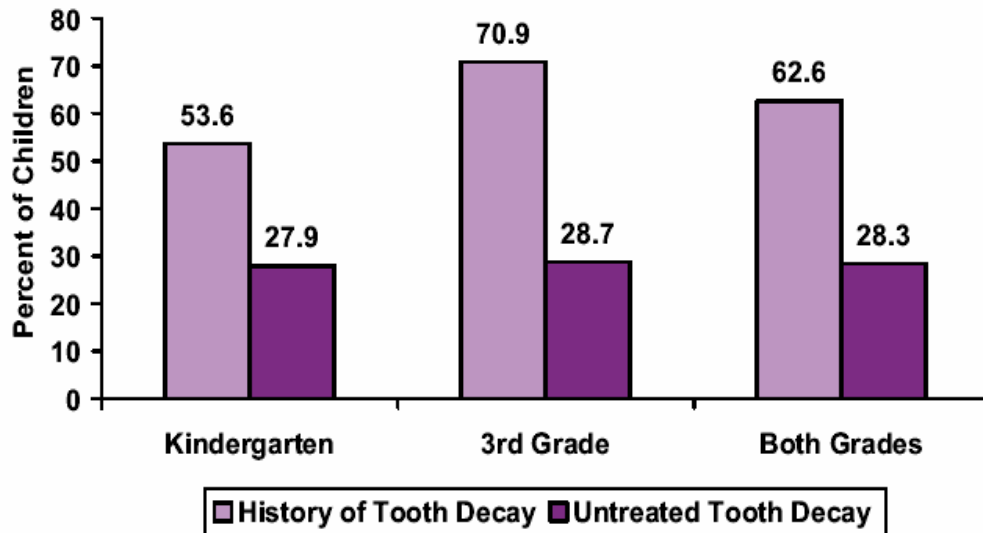
Population Considerations

Percent of U.S. Children with Clinical Evidence of Decay by Age



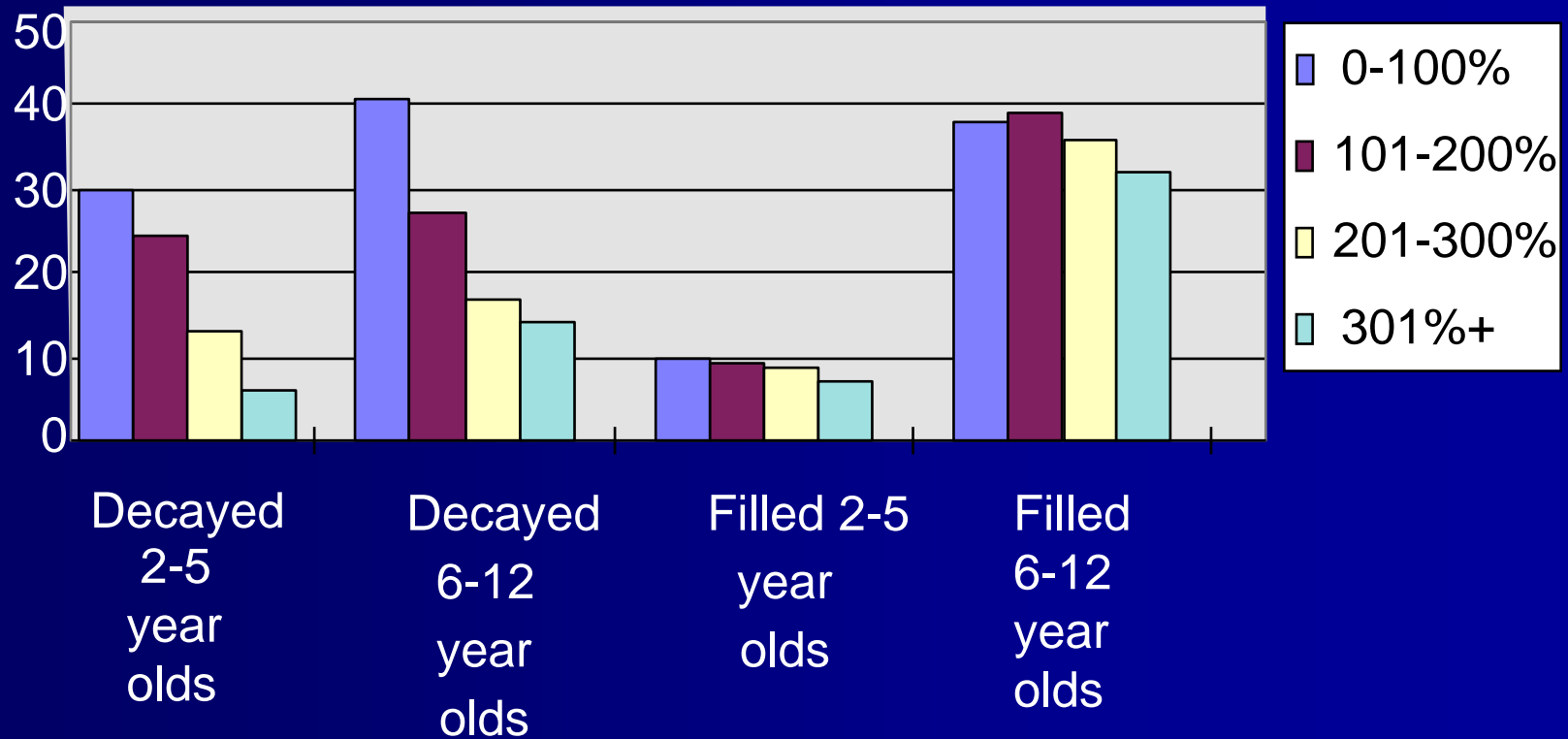
Dental Caries in California's School Children: 2005

Percent of Children with a History of Tooth Decay and
Untreated Tooth Decay



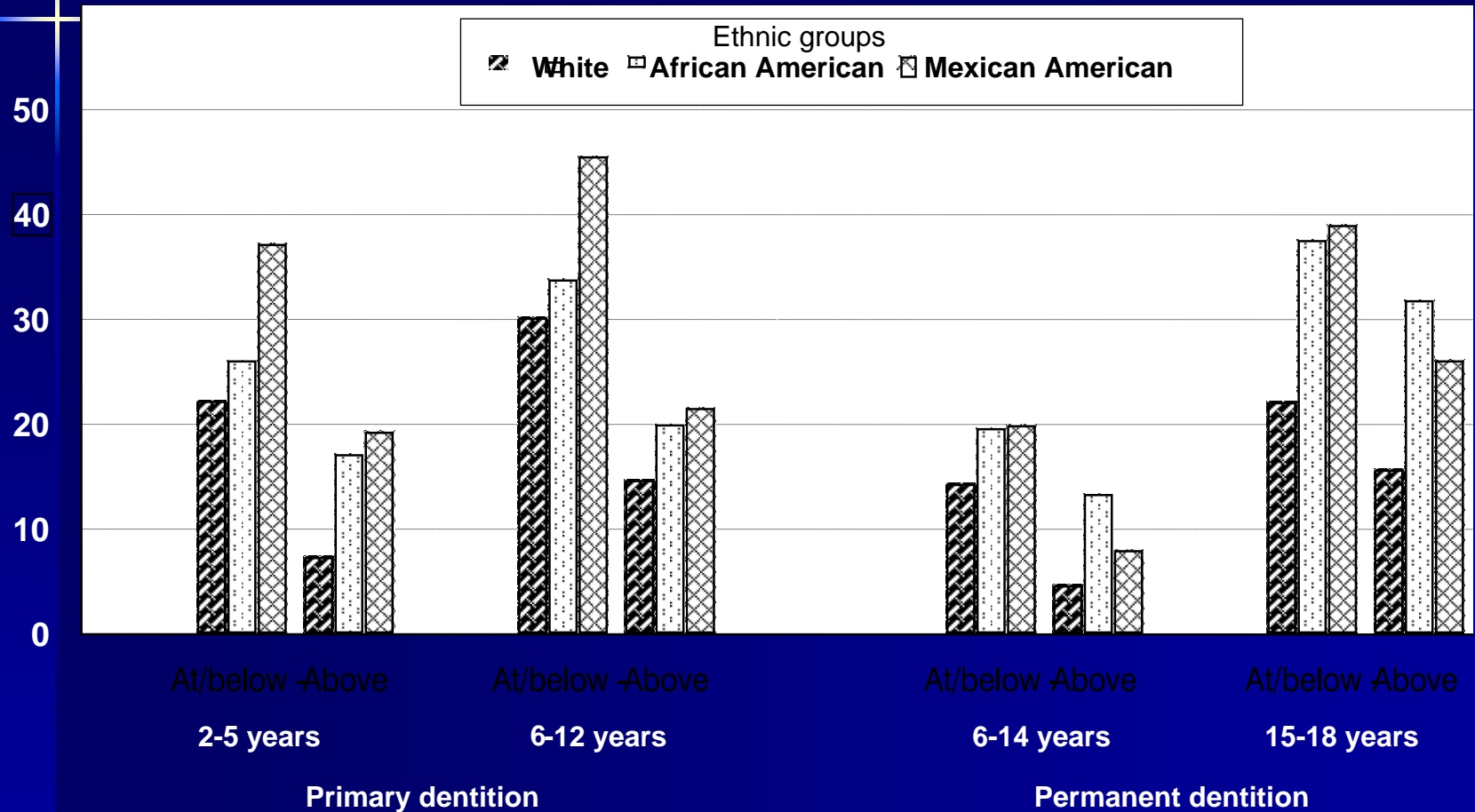
- Decay Experience:
 - 54% by Kindergarten
 - 71% by 3rd Grade

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)

Percent of children



Individual Considerations

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 'multifactorial' 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-conferring 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.

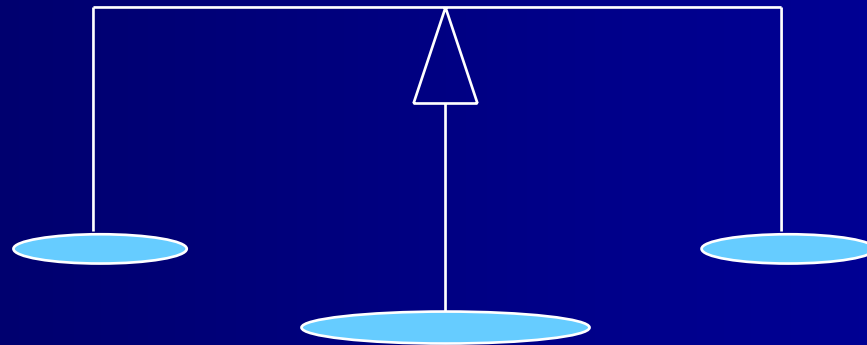
Let us keep in mind that dental caries is ubiquitous in all populations [Fejerskov and Baelum, 1998], but the incidence rate varies greatly within and between populations. It is important to appreciate that the caries incidence rate in a group of individuals appears fairly constant throughout life if 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

Adapted from Featherstone JDB: JADA 131:887-99, 2000

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

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**

- **No Lesions**
- **High Risk**

- **Initial Lesions Only**

- **Advanced Lesions**

- **Counseling to maintain low risk**
- **Anticipatory Guidance**
- **Primary prevention (e.g., fluoride, sealants)**
- **Recommend 'dental home'**
- **Reassess in 12 mos.**
- **Data Entry**

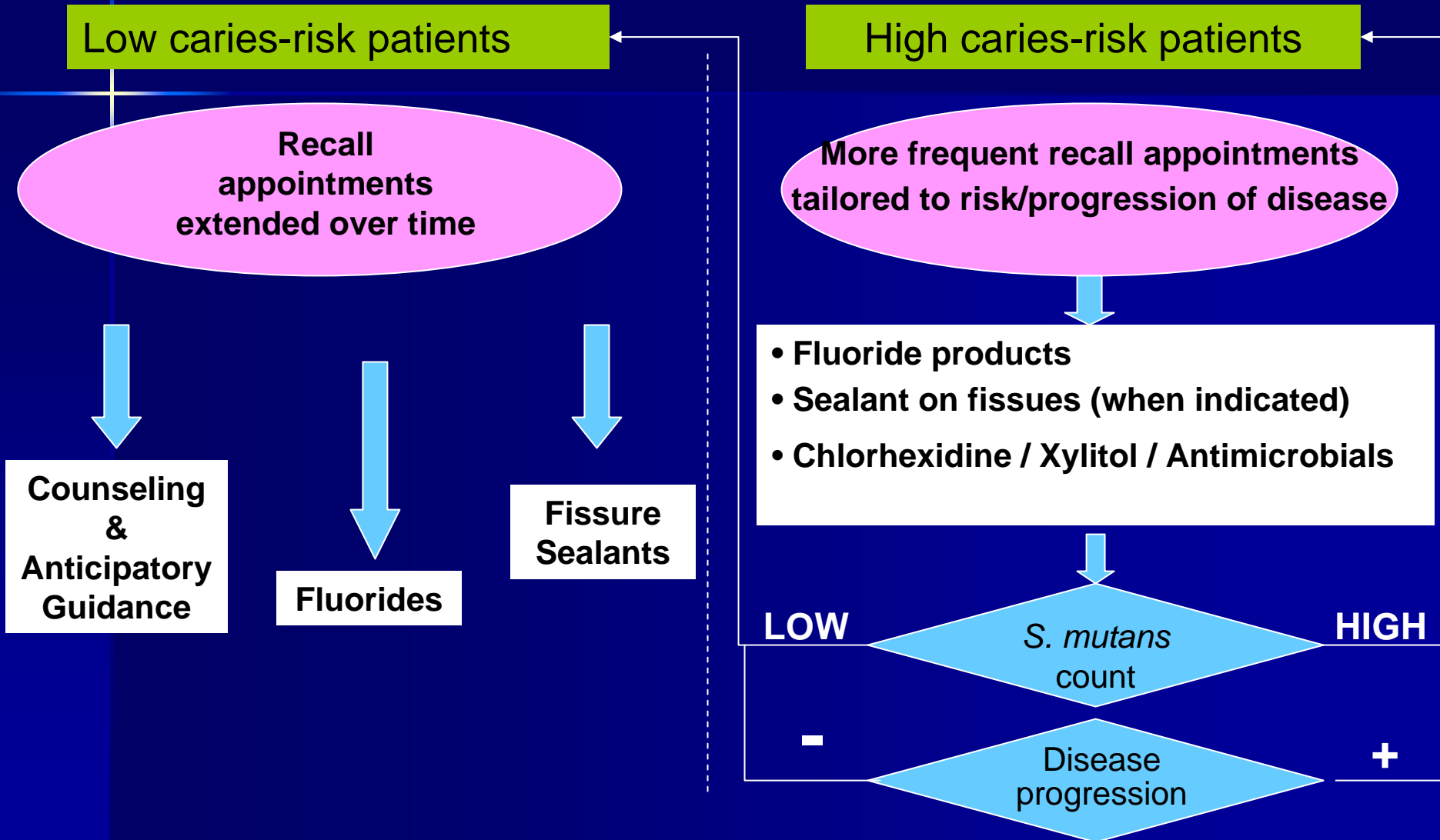
- **Risk management program to reduce risk**
- **Anticipatory Guidance**
- **Primary Prevention**
- **Refer to dental home**
- **Reassess in 6 mo**
- **Data Entry**

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

- **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**

See Crall JJ. Ped Dent 2005;27:323-330.

Risk-based Management of Initial Carious Lesions



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

Source: American Academy of Pediatric Dentistry Reference Manual. Available at: www.aapd.org.

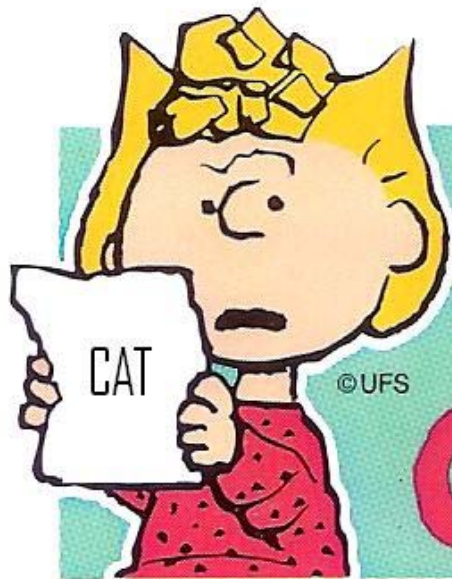
AAPD Caries-Risk Assessment Tool (CAT)

		Low Risk	Moderate Risk	High Risk
Caries Risk Indicators	Clinical Conditions	<ul style="list-style-type: none"> No decayed teeth in past 24 months No enamel demineralization (enamel caries “white-spot lesions”) No visible plaque; no gingivitis 	<ul style="list-style-type: none"> Decayed teeth in the past 24 months 1 area of enamel demineralization (enamel caries “white-spot lesions”) Gingivitis^a 	<ul style="list-style-type: none"> Decayed teeth in the past 12 months More than 1 area of enamel demineralization (enamel caries “white-spot lesions”) Radiographic enamel caries Visible plaque on anterior (front) teeth High titers of mutans streptococci Wearing dental or orthodontic appliances^b Enamel hypoplasia^c
	Environmental Characteristics	<ul style="list-style-type: none"> Optimal systemic and topical fluoride exposure^d Consumption of simple sugars or foods strongly associated with caries initiation^e primarily at mealtimes High caregiver socioeconomic status^f Regular use of dental care in an established Dental Home 	<ul style="list-style-type: none"> Suboptimal systemic fluoride exposure with optimal topical exposure^d 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 	<ul style="list-style-type: none"> Suboptimal topical fluoride exposure^d 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
	General Health Conditions			<ul style="list-style-type: none"> Children with special health care needs^g Conditions impairing saliva composition/flow^h

AAPD CAT Feasibility Testing

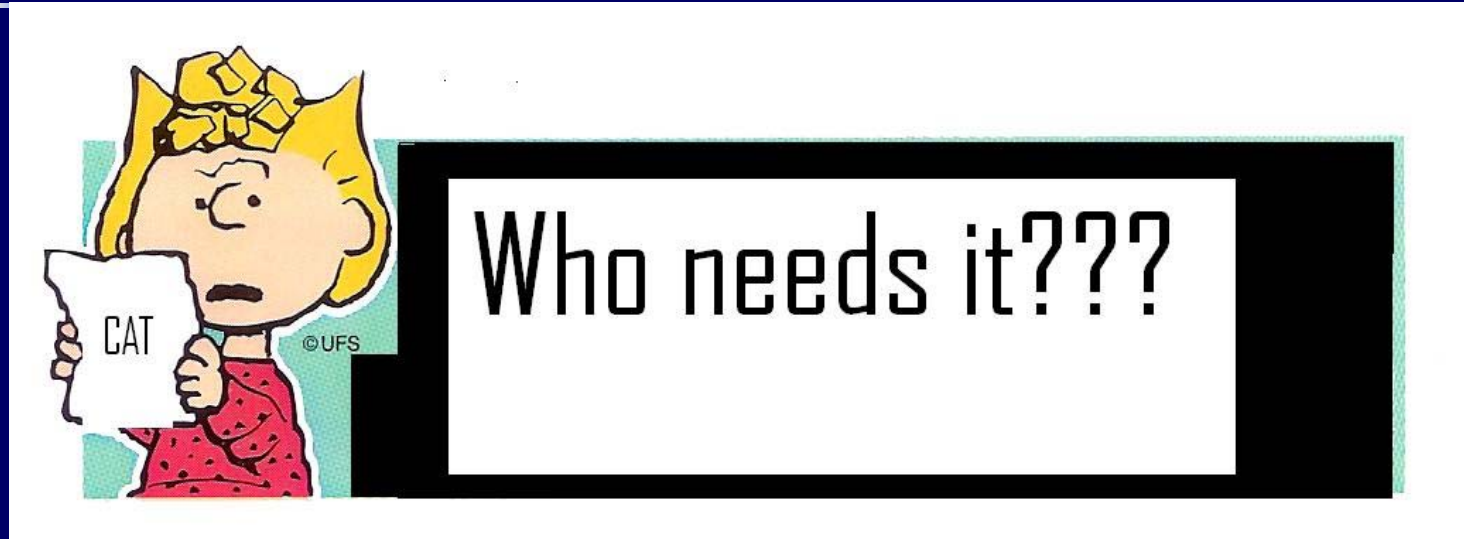
- **Pediatric Dental Practice** (*AAPD, unpublished test results*)
 - Practical for use in clinical practice
 - Clinical support staff found it useful for differentiating patients and educating patients
- **Clinical Dental Education** (*Nainar & Straffon, J Dent Educ, 2006;70:292-295.*)
 - Most students 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?!

Other Reactions: Experienced Dentists with CRA Guidelines



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