Are We There Yet? Progress on Real-Time and Virtual Oral Disease Surveillance for Improved Outcomes

Margaret Scarlett DMD,
CAPT (ret.), USPHS, CDC
President, Better Community Health

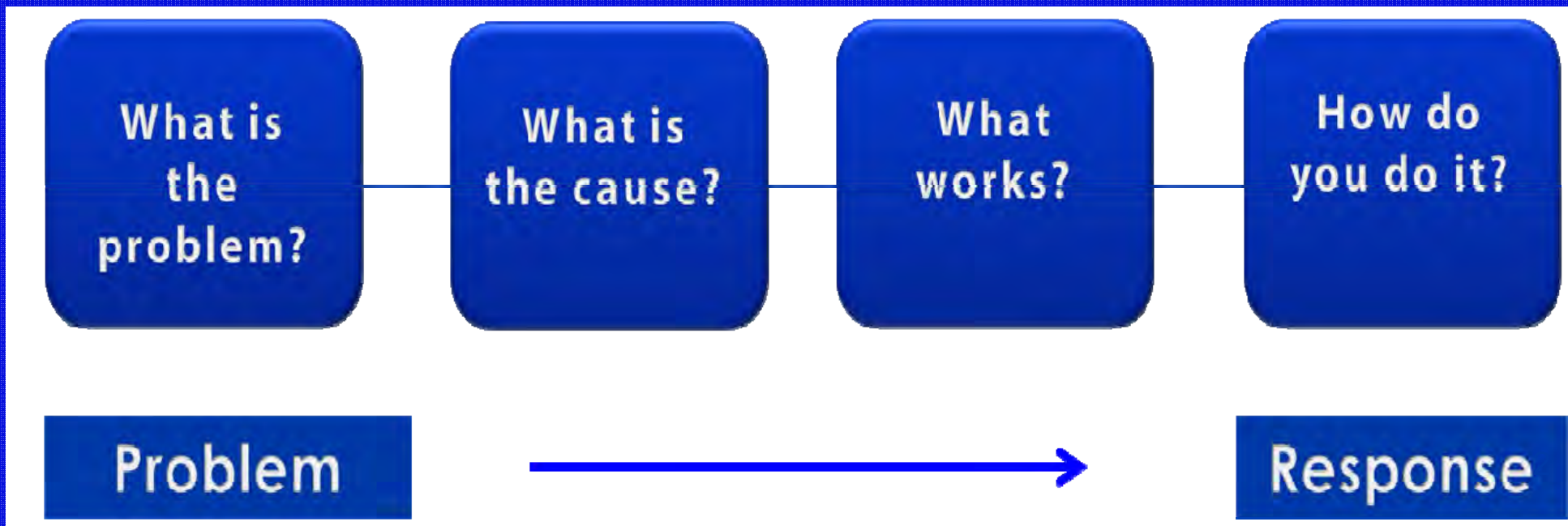
A Public Health Approach

Surveillance

Risk Factor Identification

Intervention Selection and Evaluation

Implementation and Evaluation



Oral-Systemic Health
Review of Systems with HEENOT

HEENT
Old Head and Neck Exam

H-Head

E-Ears

E-Eyes

N-Nose

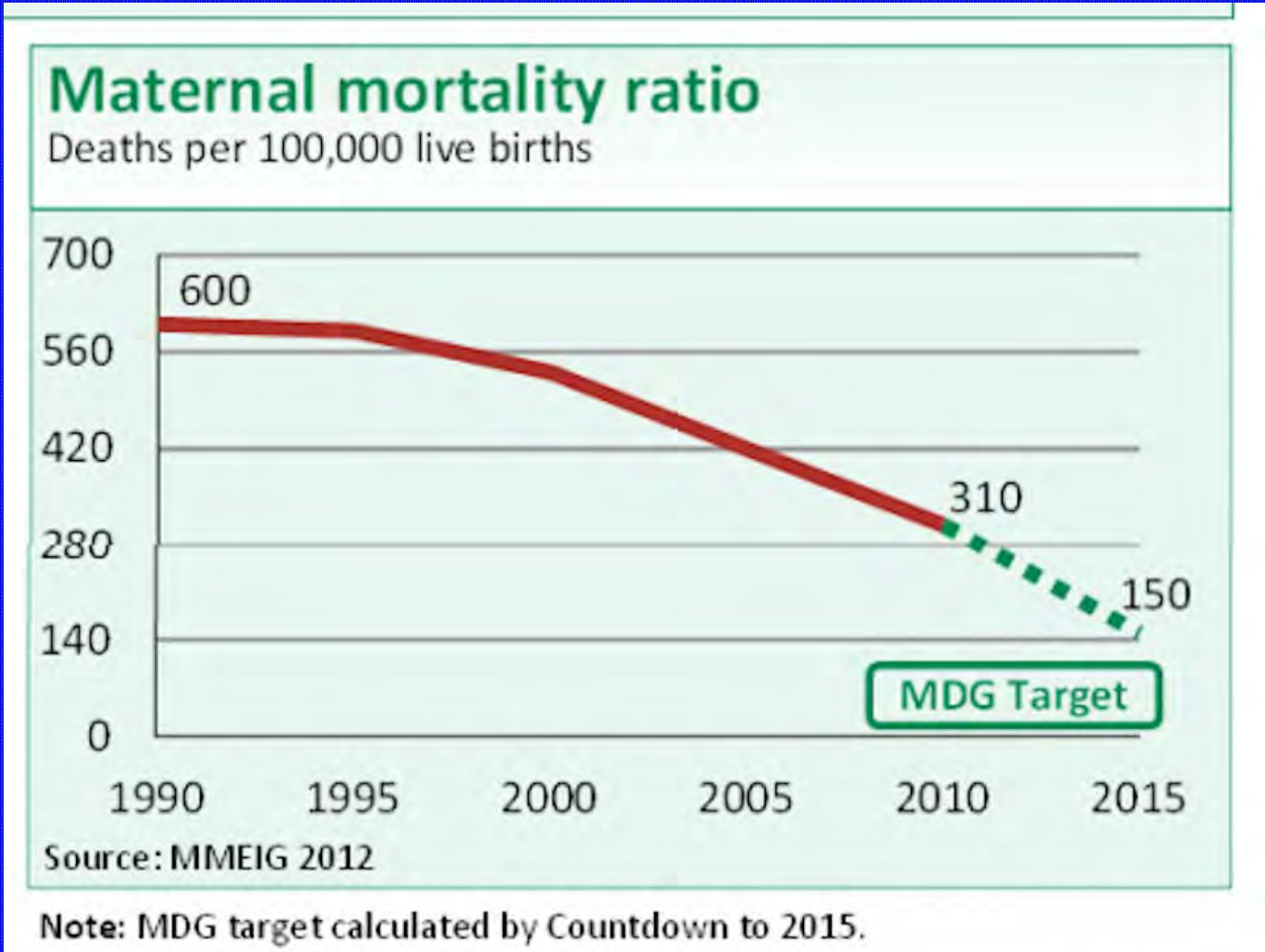
T-Throat

HEENOT
New Head and Neck Exam

H-Head
E-Ears
E-Eyes
N-Nose
O-Oral Cavity
T-Throat

Haber et al. (2015) HEENT to HEENOT. AJPH.

Morbidity/Mortality per 100,000



Note: MDG target calculated by Countdown to 2015.

Epidemiology in Public Health

All illustrate the purpose of Epidemiology/Surveillance in Public Health, EXCEPT:

A. Identifying populations who are at risk for certain diseases.

B. Assessing the effectiveness of interventions.

C. Providing treatment for patients in clinical settings.

D. Determining the important causes of illness.

PURPOSE: SURVEILLANCE Data collected to identify levels of need and related trends over time in populations –but not intended for clinical use

DMFT-Decayed, Missing, Filled Teeth

Advantages

- Established Measure
- Baseline and Trend Data recognizable

- Valid, Reliable and Feasible
- Calibrated by a national network of researchers

- Small group of specialty dentists to report (n=146)
- NHANES (CDC)

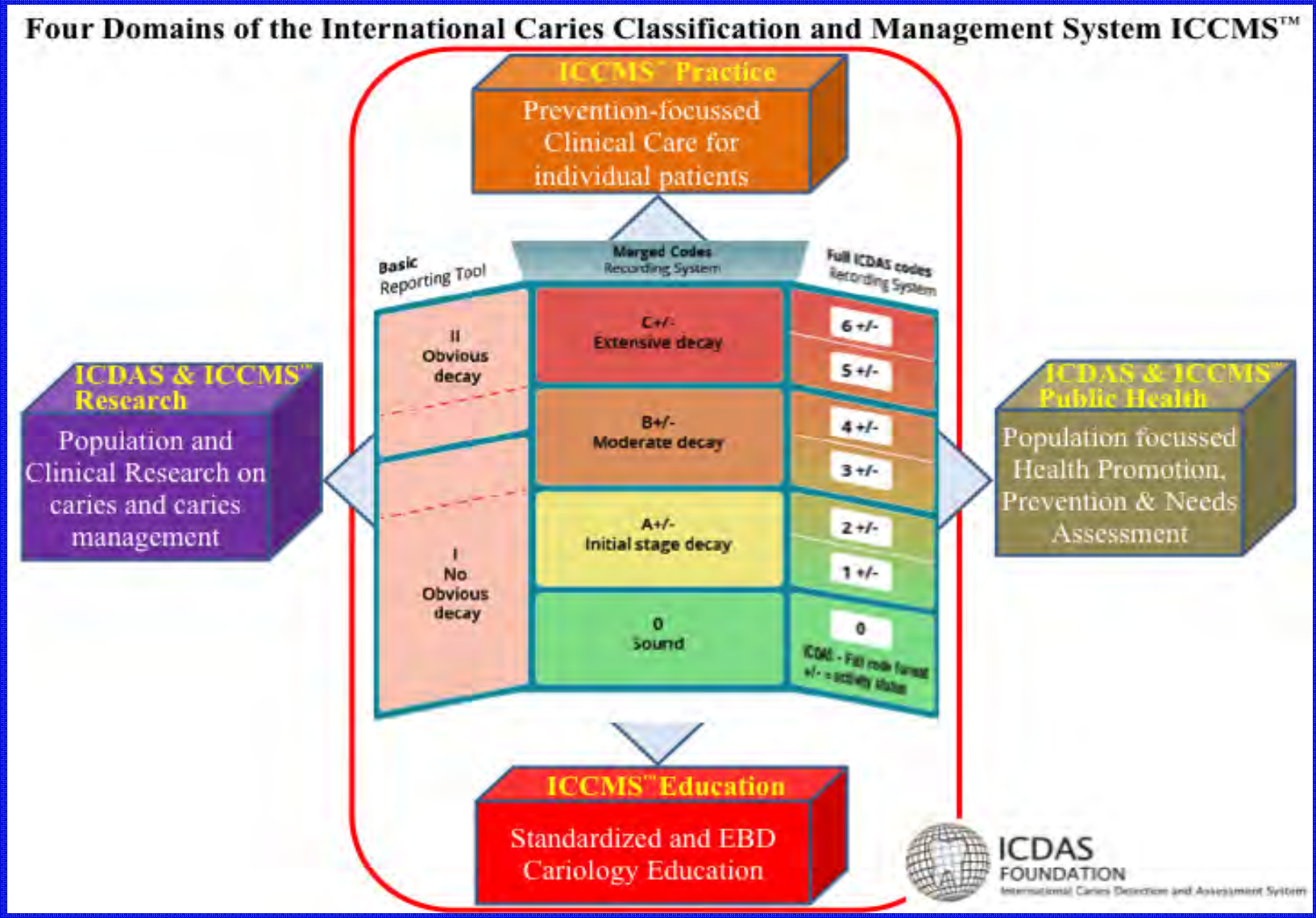
Disadvantages

- 1930s screening tool
- Lacks sensitivity and specificity (99%)
- **Variability in cut off for measurement (Pitts, 2010)**
- Individual and professional use limited

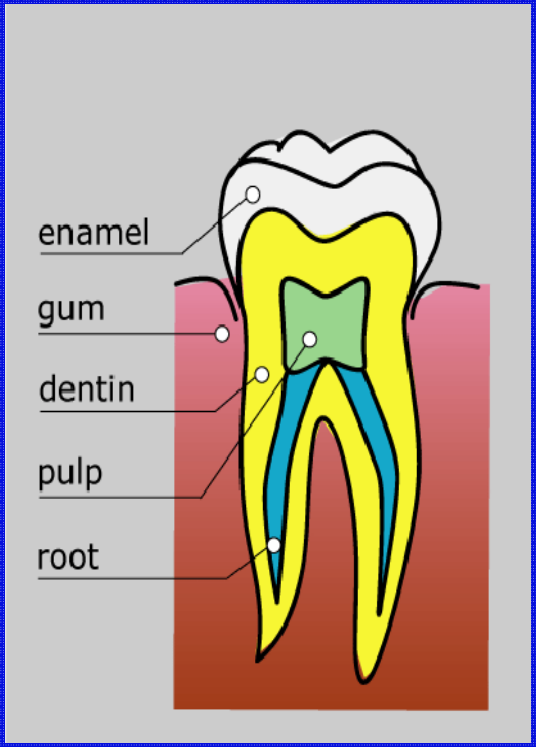
- Does not measure individual tooth morbidity/mortality/pain/function

- Not useful for mixed dentition and the list goes on

Caries—ICDAS or CCS (US)



Is DMFT the right measure at this time for caries or even oral health?



- Reviews of visual caries diagnosis have been critical of current methods used in clinical studies.

  Bader JD (2002); Ismail AI (2008)

- Use of traditional methods, where the detection threshold is at the level of cavitation, had either been found to be outmoded or insufficient given the current knowledge of dental caries.

  Pitts N (2004) ; Agustsdottir H (2010)

- A study compared ICDAS with WHO on primary teeth, finding that including all codes of ICDAS detected greatly higher number of lesions than the WHO basic methods criteria.

  Kuhnisch J (2008)

Is DMFT the right measure at this time for caries or oral health?

Option for ICDAS II

- With information of lesion severity, lesion activity, and restorative materials present, it was possible to obtain an overview of the most recent trends in caries development and restorative interventions used to treat it.

  Finlayson TL (2007); Ismail AI (2008); Agustsdottir H (2010)

- The ICDAS criteria allow accurate recording of the severity of carious lesions, through noncavitated stages, to frank cavitation, and have been found to increase level of caries detection over traditional methods

  Kuhnisch J (2008)

Paolo Melo, ORCA, 2014

ICCMS/ICDAS superior to DMFT (Portugal, n=3710)

	6 year olds	12 year olds	18 year olds	Difference
ICDAS 3	2.55	1.96	3.75	25-55% more decay
DMFT	1.65	1.58	2.66	

Melo, (2015) ORCA

ICDAS identifies more preventable tooth decay

	6 year olds	12 year olds	18 year olds	Difference
ICDAS 2-Enamel lesions	3.29	3.36	5.48	100% more decayed teeth
DMFT	2.64	1.58	2.35	
ICDAS-2 Caries free	30.6%	23.9%	11.0 %	40-70 % less cavity free
DMFT caries free	54%	53%	32.4%	

ICCMS/ICDAS superior to DMFT

Adults

DMFT/dmft would underestimate 16.6 % of non-cavitated lesions

Children

DMFT/dmft would underestimate 60% of non-cavitated lesions

Melgar, RA et al. Differential Impacts of Caries Classification in Children and Adults: A Comparison of ICDAS and DMF-T. (2016) *Braz Dent J.* 27(6):761-766.

Other Issues than caries (UK): Policy Problems Eating, Smiling, Laughing

1 in 7 children (15%) of 15 year olds have severe or extensive decay or both.

Wales and Ireland :Caries free children 33-42% less with ICDAS/ICCMS

Children from poor families more likely to have oral disease than others.

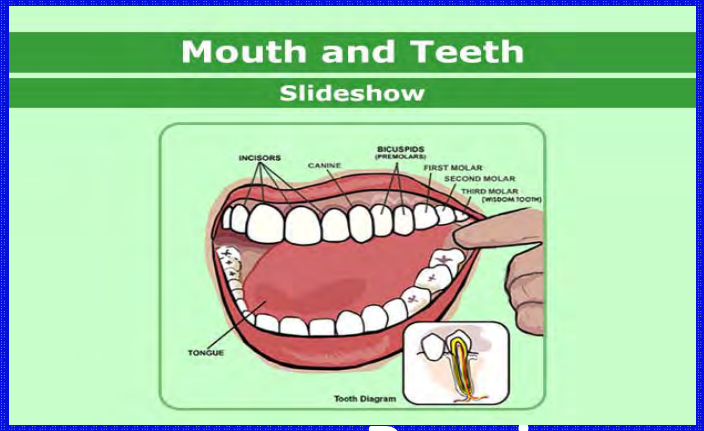
More than a fifth of 12- and 15-year-olds (22% and 19% respectively) reported experiencing difficulty eating in the past three months

More than one third (35%) of 12-year-olds and more than a quarter (28%) of 15-year-olds reported being embarrassed to smile or laugh because of the condition of their teeth

58% of 12-year-olds and 45% of 15-year-olds reported that their daily life had been affected by problems with their teeth and mouth in past 3 mos

NHS; (hscic.og/uk/pubs)

Oral Health Surveillance



General Issues:

- Surveillance= determine time, place, and person
- Identify the population at greatest risk
- Determine the most important biological causes of the oral conditions (high levels of S. Mutans, P. gingivalis, A.A., low Lactobacillus, etc.)

Requirements

- Used for determining the effectiveness of interventions

(few effective interventions: review chapter Oral Health Promotion Scarlett and Kreps in Zimmerman et al. Global Health Promotion; Wiley, 2016)

- Measure of major oral health issues: caries, periodontal disease, force, erosion, oral pathology as primary or secondary to disease or condition

Ideal Surveillance Oral Health

Requirements

- Reported from any health professional (dentist, nurse, PA, physician)
- Could be self-reported by individuals (selfie?)
- Low cost and replicable
- Could be used in longitudinal studies

Requirements

- High sensitivity and specificity (ex: Orasure 99.6%, low false positive/negative
- Measures

a) Oral Pain or Toothache

b) Esthetics

c) Function and

d) Oral disease and condition

Self-Report of toothache and cavity reliable

Study sample (N = 1,658)

Perceived dental health notably lower in the presence of a toothache, increasing numbers of decayed teeth, and worsening periodontal health. Nonwhites and those persons with lower educational and income levels reported more impact.

Respondent's report of a toothache and, secondarily, numbers of decayed teeth were the most important explanatory factors.

Gooch BF, Dolan TA, Bourque LB (1989) Correlates of self-reported dental health status upon enrollment in the Rand Health Insurance Experiment. *J Dent Educ.* 53: 629–637.

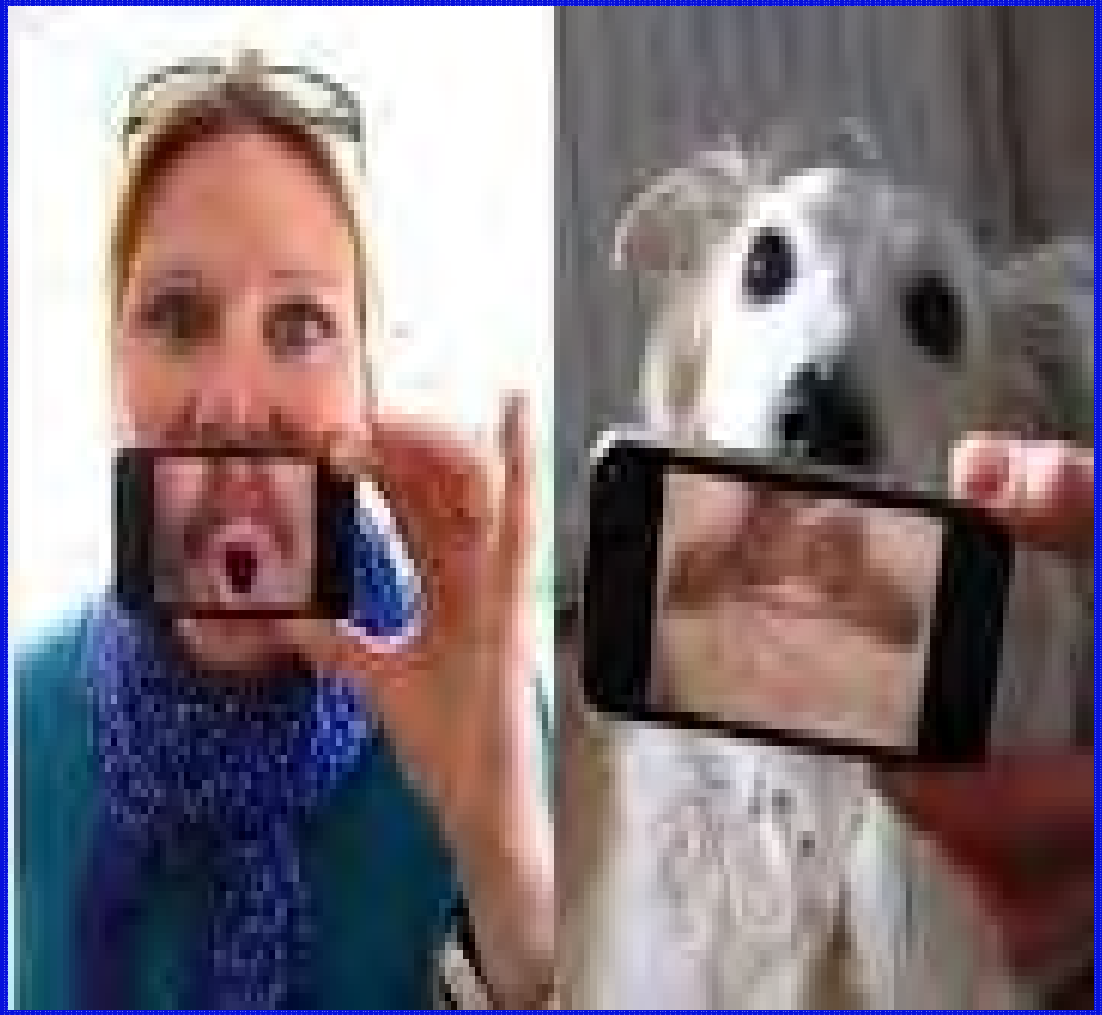
"These findings suggest that in the future improved self-reported measures, in addition to clinical indicators, may be an acceptable and cost-effective method of epidemiological data collection and dental health outcome assessment."

Promising Systems:
Sophisticated Statistical Analyses

1. **Caries and Periodontal Disease- Innovative Small Estimation Method (SEA) (THIS CONFERENCE) CDC (Room 215)**
2. **Periodontal Profile Class approach (Latent Class Analysis) (Morelli et al. (2017) *J of Perio*)**

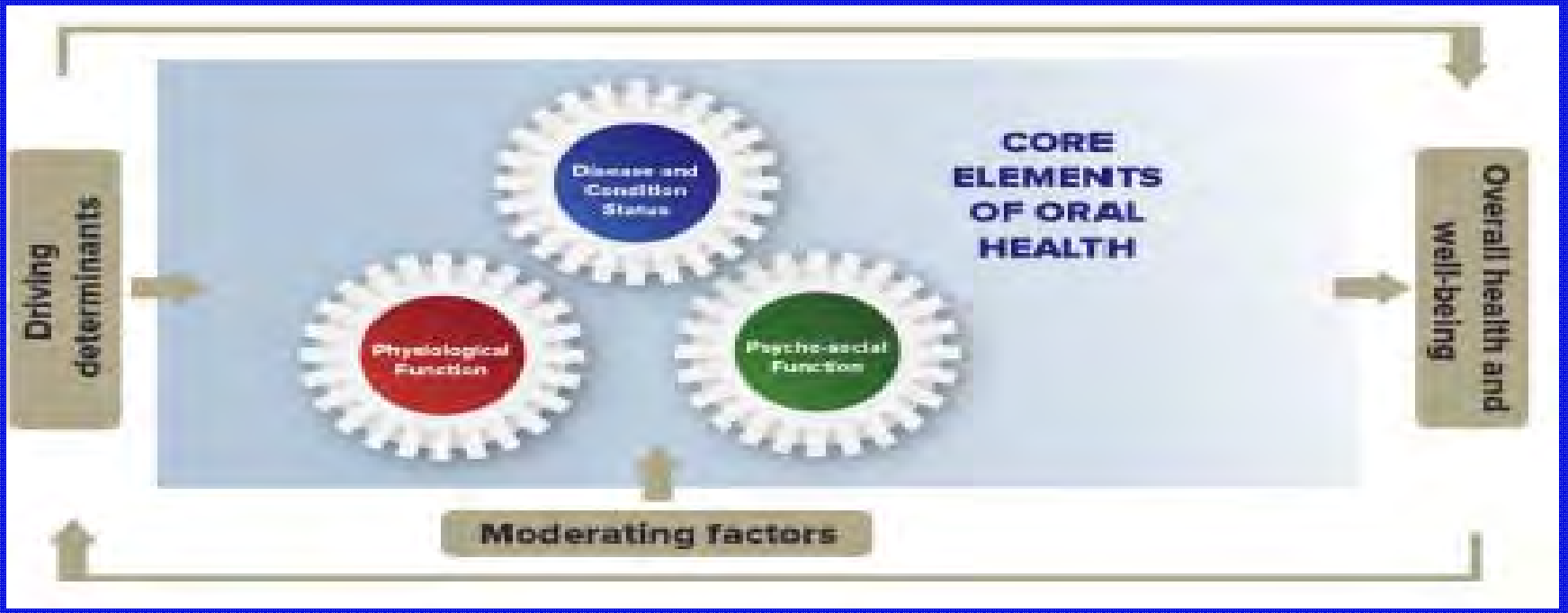
Virtual Surveillance w/ Devices

- Exciting promise
- Validity, reliability and feasibility should be established
- Reproducibility with early detection devices (e.g. lasers)
- Harvard phone app/photo/analysis
- Teledentistry holds promise for automated detection devices as an aid to diagnosis



Promising Systems

FDI- Data TBA India (Apr 2017)



Oral Health Definition–speak,smile,taste,touch,chew,swallow; Without pain, discomfort or disease

Oral health and wellbeing: Physiological function, psychosocial function and disease and condition

Glick et al. (2016) *JADA*

Questions? Possibilities?