Dental Public Health

Part 1: Principles in Dental Public Health

Name: _______________
Title: ________________

in collaboration with:

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Learning Objectives

Upon completion of this presentation, participants should be able to:

• Describe the differences between a dental public health practice model and a private practice model;

• List available resources that describe oral health status in the United States;

• Explain the effects of social and behavioral effects on one dental disease, and develop a scenario where these effects could be seen in an IHS setting.
Presentation Overview

• Public health vs. private practice

• Basic epidemiology concepts

• Key oral health surveys

• Critical reading of research

• Social and behavioral dimensions of dental disease
Disclaimer

• Each section of this presentation is a condensed version of a public health course.

• This presentation is designed to provide only an interview of key dental public health data and concepts.

• Please refer to the references section to learn where you can get additional information on each topic presented.
Definition

- **Dental Public Health** is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts.

  *American Association of Public Health Dentistry, 2006*

- 25% of adults over age 60 have lost all of their teeth
- 11.2% of the population is at some stage of oral or pharyngeal cancer
- 22% of children aged 6-11 have untreated tooth decay
- More than 90% of systemic diseases produce oral signs and symptoms
- Almost all oral diseases can be prevented!
Essential public health services

1. Monitor health status to identify community health problems.

2. Diagnose and investigate health problems and health hazards in the community.

3. Inform, educate, and empower people about health issues.

4. Mobilize community partnerships to identify and solve health problems.

5. Develop policies and plans that support individual and community health efforts.

Association of Schools of Public Health
6. Enforce laws and regulations that protect health and ensure safety.

7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.

8. Assure a competent public health and personal health care workforce.

9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.

10. Research for new insights and innovative solutions to health problems.

Association of Schools of Public Health
Private Practice Model

1. History and Examination
2. Diagnosis
3. Treatment Planning
4. Treatment
5. Payment for Services Rendered
6. Evaluation

DHHS, An Introduction to Dental Public Health
Public Health Dental Model

- **Survey**: Assess the nature and extent of the problem
- **Analysis**: Use statistical tools to determine meaning of the problem
- **Program Plan**: Determine cost-effective, broad-based plan to address the community
- **Program Operation**: Carry out the program(s)
- **Finances**: Determine sources of possible funding
- **Evaluation**: Evaluate effectiveness and future direction of the program

DHHS, *An Introduction to Dental Public Health*
The challenge in the Indian Health Service is treating the patient while at the same time creating programs that improve the oral health of the entire population.
Basic Epidemiology Concepts
Concept 1: Prevalence vs. Incidence

• Prevalence
  • Number of people in a defined population who have a specified disease or condition at a fixed point in time divided by the size of the population at that time
  • Caries Prevalence, 2010 = # of people with caries in 2010/total population
  • Caries prevalence almost always goes up, as new cases are added.

• Incidence
  • Number of new cases (occurrences) of a specified disease during a given time period divided by the size of the population in that specific time interval.
  • Caries Incidence, 2010 = # of patients with new caries/total population
  • Caries incidence can decrease in any time period (new cases are less)

• Both of these are often reported as “rates,” so you need to understand what is being said.
Concept 2: DMFT (dmft)

- **DMFT** describe the amount - the prevalence - of dental caries in an individual. DMFT are means to numerically express the caries prevalence and is obtained by calculating the number of:
  - Decayed (D) - How many teeth have caries lesions (incipient caries not included)?
  - Missing (M) - How many teeth have been extracted?
  - Filled (F) - How many teeth have fillings or crowns?
  - Teeth (T) - It is either calculated for 28 (permanent) teeth, excluding 18, 28, 38 and 48
- It is thus used to get an estimation illustrating how much the dentition until the day of examination has become affected by dental caries.
- A more detailed index is DMF calculated **per tooth surface**, DMFS. Molars and premolars are considered having 5 surfaces, front teeth 4 surfaces. Again, a surface with both caries and filling is scored as D. Maximum value for DMFS comes to 128 for 28 teeth.
- For the **primary dention**, consisting of maximum 20 teeth, the corresponding designations are "deft" or "defs", where "e" indicates "extracted tooth".

World Health Organization (WHO)
Concept 3: Estimating Risk - RR

• Answers the fundamental question: Is there an association?

• Relative risk (RR) – the ratio of the risk of disease in exposed individuals to the risk of disease in non-exposed individuals.
  • If RR = 1, then no association
  • If RR > 1, then risk is higher in exposed vs. non-exposed (positive association)
  • If RR < 1, then risk is lower in exposed (negative association)
Concept 3: Estimating Risk - OR

- Answers the fundamental question: Is there an association?

- Odds Ratio (OR) – the odds than an exposed person develops disease/ the odds than a non-exposed person develops disease
  - If RR = 1, then no association
  - If RR > 1, then risk is higher in exposed vs. non-exposed (positive association)
  - If RR < 1, then risk is lower in exposed (negative association)
Concept 4: Changes in Prevalence

• The prevalence of dental disease does not typically decrease over time in the same cohort.
  • DMFT does not decrease usually
  • Caries Prevalence does not decrease usually
  • Exception: Fluoride does have some reversing effect
  • Periodontal Disease Prevalence may decrease depending on how it is measured:
    • Pocket depths may decrease, active periodontitis may be eliminated, attachment loss may be re-gained, but a history of periodontal disease and/or bone loss doesn’t disappear (without grafts)
Concept 5: Types of Bias

• It is important to understand different types of bias that may affect the validity of studies.

• Selection bias
  • Non-responses
  • Systematic error in selecting participants (IHS OHS)
  • Exclusion bias (different eligibility criteria used)

• Information bias
  • Bias in abstracting records, interviews
  • Surveillance bias (following a population more closely)
  • Reporting bias (attitudinal)

• Confounders – a 3rd factor is to explain (coffee leads to cancer)

Gordis, Leon. *Epidemiology.*
Key Oral Health Surveys
The National Health and Nutrition Examination Survey (NHANES) is a program of studies designed to assess the health and nutritional status of adults and children in the United States. The survey is unique in that it combines interviews and physical examinations.
NHANES IV
Dental component

• What is NHANES?
  • Standardized dental epidemiological exams have been periodically included in the national health surveys.

• Dental exam content was (is) in:
  • National Health Examination Surveys (1960’s)
  • NHANES I (1971-75)
  • HHANES (1982-84)
  • NHANES III (1988-94)
  • Current NHANES (1999+)
NHANES Summary

• To learn more about NHANES:

  • Visit the NHANES website at: http://www.cdc.gov/nhanes

  • Or call 1-800-452-6115
IHS Oral Health Survey

- Looked at several different age cohorts:
  - 2-5 year-olds (preschool)
  - 6-14 year-olds (elementary and middle school)
  - 15-19 year-olds (adolescents)
  - 35-44 year-olds (adults)
  - 55+ year-olds (elders)
- Sample bias that may have resulted in overestimation of disease (survey participants were dental patients)
- Surveys were similar in methodology except:
  - 1984 survey collected tooth-specific data only (DMFT)
  - 1991 and 1999 surveys were in greater deal (DMFS)
  - Explorers were used in 1984 and 1991, but not into 1999
The Basic Screening Survey (BSS) is used by states to assess oral health status. Developed by the American Association of State and Territorial Dental Directors, this survey can be done in the dental clinic, at health fairs, at other screening opportunities, and through a retrospective chart review.

Why do a Basic Screening Survey? This survey will help you determine baseline data for the population you serve.

Once you have this information, you can then compare it to your state and nationally by going to the National Oral Health Surveillance System website at http://www.cdc.gov/ohss/index.htm.
# Sample Oral Health Screening Form/Preschool Children

<table>
<thead>
<tr>
<th>Screen Date:</th>
<th>Site Code:</th>
<th>Screener's Initials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ / ___ / ___</td>
<td>___ / ___ / ___</td>
<td>___ / ___ / ___</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID Number:</th>
<th>Age:</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ / ___ / ___</td>
<td>___ / ___ / ___</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender:</th>
<th>Race/Ethnicity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=Male 2=Female</td>
<td>1=White 2=Black/African American 3=Hispanic/Latino 4=Asian 5=American Indian/Alaska Native 6=Native Hawaiian/Pacific Islander 7=Multi-racial 9=Unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Untreated Decay:</th>
<th>Treated Decay:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0=No untreated cavities 1=Untreated cavities</td>
<td>0=No treated decay 1=Treated decay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Early Childhood Caries:</th>
<th>Treatment Urgency:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0=No ECC 1=ECC</td>
<td>0=No obvious problem 1=Early dental care 2=Urgent care</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comments:</th>
</tr>
</thead>
</table>

NOTE: If you are collecting information on date of birth, age and race using a questionnaire, you can delete those fields from this form.

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*Basic Screening Survey Manual, 2008.*
Medical Expenditure Panel Survey

- The Medical Expenditure Panel Survey (MEPS) is a set of large-scale surveys of families and individuals, their medical providers, and employers across the United States. MEPS is the most complete source of data on the cost and use of health care and health insurance coverage.

- Available at www.meps.ahrq.gov

- Key data:
  - Dental access, dental expenditures, % with insurance, age distribution of dental expenditures.

Understanding Dental Research

(How to know if what you read is true)
Critical Reading:
Data Requirements

1. Is the study clear about how the measurement was done?
2. Is there some measure of central tendency (mean, median, mode)?
3. Is there some measure of variation (standard deviation, standard error, confidence limits, or range)?
4. Is there some statement about the total number of objects studied?

• All of these must exist in the study!

Brunette, Donald. Critical Thinking: Understanding and Evaluating Dental Research.
Criteria for Causality

- Biologic Plausibility (must make sense)
- Consistency of Association (multiple studies)
- Strength of Association
- Time Sequence (exposure must precede disease)
- Degree of Exposure (does-response relationship)

5 criteria to show causality

Burt/Eklund. Dentistry, Dental Practice, and the Community.
Critical Reading:

Study Design

• Non-experimental designs
  • Cross-sectional – population is studied at 1 point in time (prevalence). Example is a survey
  • Longitudinal – same population is studied on two or more occasions (incidence)
    • Retrospective – inferences about exposure are derived from data related to characteristics of those being studied (such as a case-control study)
    • Prospective – collect information on exposure and compare eventual outcomes (such as a cohort study)

• Experimental designs
  • Clinical trials – can be double, single, or non-blinded

Burt/Eklund. Dentistry, Dental Practice, and the Community.
Critical Reading: Reliable Sources

- Peer-reviewed journals (JADA, GenDen)
- Government sources (CDC, NIH, Medline/PubMed)
- Professional Organizations (ADA, AGD, Specialty Groups)
Social and Behavioral Dimensions of Dental Disease: An overview
Oral-Systemic Disease Links

- Oral infections have been linked to the following:
  - Adult respiratory distress syndrome (ARDS)
  - Development of brain abscesses
  - Infective endocarditis
  - Chronic obstructive pulmonary disease (COPD)
  - Poorer glycemic control
  - Cardiovascular disease
  - Stroke
  - Delivery of pre-term, low birth weight babies

Tooth Abscess

IHS ECC Initiative
Social Consequences

• Having missing teeth is linked to a qualitatively poorer diet.
  • Surgeon General’s Report on Oral Health

• Early childhood caries has an impact on speech development, nutrition, and quality of life, even into adulthood.

• Poor oral health can lead to decreased school performance, and poor social relationships.
Speech Development

IHS ECC Initiative
Social Consequences

• An estimated 51 million school hours per year are lost because of dental visits and oral health problems.

• Approximately 80 percent of untreated dental caries is found in about 25 percent of children and adolescents ages 5-17.

• Children whose mothers have poor oral health are five times more likely to have oral health problems than children whose mothers have good oral health.
Early Childhood Caries Prevalence in 2-5 Year-Olds

- Caries Experience: NHANES, 2004 = 28, IHS 1999 Oral Health Survey = 76
- Untreated Decay: NHANES, 2004 = 23, IHS 1999 Oral Health Survey = 68
References

• This book is the “must have” to learn more about dental public health:

References

• Other books used during this presentation that can provide additional details:
  
  
  
  
  
  
References

• Other reference materials used:
  
  
  
  
  
  