Advances in Oral Health Surveillance: CDC’s Periodontitis Surveillance Project

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Disclaimer: The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention
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NHANES Periodontal Examination Protocols - History

NHANES III
1988 – 1994
- Partial Mouth
- Two Quadrants
  - Two sites per tooth – 64 sites per subject

NHANES
2001 - 2004
- Partial Mouth
- Two Quadrants
  - Three sites per tooth – 96 sites per subject

NHANES
2009 -2014
- Full Mouth
- All Four Quadrants
  - Six sites per tooth – 192 sites per subjects
Case Definitions Proposed for Population-Based Surveillance of Periodontitis

**Severe Periodontitis:** ≥2 interproximal sites with CA loss ≥ 6 mm (not on same tooth) and ≥1 interproximal sites with PD > 5 mm

**Moderate Periodontitis:** ≥2 interproximal sites with CA loss ≥ 4 mm (not on same tooth); OR ≥ 2 interproximal sites with PD > 5 mm (not on same tooth)

**Mild Periodontitis:** ≥2 interproximal sites with ≥3mm CA loss, and ≥ 2 interproximal sites with ≥ 4 mm pocket depth (not on same tooth) or 1 site with ≥ 5 mm PD

**No Periodontitis:** No evidence of mild, moderate or severe periodontitis


NHANES 2009 - 2010

- Stratified multistage probability sample of the civilian non-institutionalized U.S. population
- ≥30 years old
- Exams by dental hygienist in the Mobile Examination Center (MEC)
- Recorded gingival recession and pocket depth
- Six sites per tooth on all tooth (except third molars)
- No Bleeding on Probing (BOP) assessed
- 3743 completed exams
- Representing weighted population of 137.1 million
- First time use of the FMPE protocol in NHANES
Prevalence of Periodontitis in U.S. Adults ≥ 30 years.

- Total: 47.2%
- Severe: 8.5%
- Moderate: 30.0%
- Mild: 8.7%
Prevalence: Full Mouth Examination Protocol (FMEP) vs. Partial Mouth Examination Protocols (PMEP)

(1) NHANES 09-10 FMEP (2) NHANES 00-04 PMEP (3) NHANES III PMEP
Prevalence of Periodontitis by Age Groups

- 30-34: Total 24.4%, Severe 1.1%, Moderate 8.9%, Mild 3.6%
- 35-49: Total 36.6%, Severe 1.7%, Moderate 10.5%, Mild 3.2%
- 50-64: Total 57.2%, Severe 2.5%, Moderate 17.4%, Mild 4.5%
- 65+: Total 70.1%, Severe 3.3%, Moderate 22.5%, Mild 6.0%
**Figure 1a.** Percentage of Attachment Loss by Age

**Figure 1b.** Percentage of Probing Depth by Age

**Figure 1c.** Periodontitis by Age
Periodontitis by Race/Ethnicity

- **Non-Hispanic White**
  - Total: 42.6%
  - Severe: 5%
  - Moderate: 25%
  - Mild: 5%

- **Non-Hispanic Black**
  - Total: 58.6%
  - Severe: 20%
  - Moderate: 30%
  - Mild: 10%

- **Mexican-American**
  - Total: 66.7%
  - Severe: 40%
  - Moderate: 20%
  - Mild: 10%
Periodontitis by Poverty Levels

- <100 FPL: 65.4%
- 100-199% FPL: 57.4%
- 200-399% FPL: 50.2%
- >400% FPL: 35.4%

Legend:
- Total
- Severe
- Moderate
- Mild
Periodontitis by Smoking Status

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Smoker</td>
<td>64.2</td>
<td>17.6</td>
<td>1.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>52.5</td>
<td>10.5</td>
<td>2.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>39.8</td>
<td>7.2</td>
<td>1.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Self-Report Measures for Surveillance of Periodontitis: Progress Update

- Collaboration between CDC, the American Academy of Periodontology (AAP), and subject matter experts in academic settings since 2003.
- Completed systematic literature review.
- Identified potential questions based on analyses of surveys that utilized self-report questions to assess periodontitis.
- Developed standard cases definition for surveillance of periodontitis.
- Completed cognitive testing of the questions in U.S. adults.
- Pilot tested questions in Australian adult population.
- Pre-tested question in a convenience sample of U.S. adults.
- Validation of questions versus clinical cases of periodontitis in a representative U.S. adult population (NHANES 2009 – 2010).
- Manuscript on the findings from NHANES 2009/2010 in final stages.
Self-report Questions

1. Gum disease is a common problem with the mouth. People with gum disease might have swollen gums, receding gums, sore or infected gums or loose teeth. {Do you/Does SP} think {you/s/he} might have gum disease?

2. Overall, how would {you/SP} rate the health of {your/his/her} teeth and gums?

3. {Have you/Has SP} ever had treatment for gum disease such as scaling and root planning, sometimes called deep cleaning?

4. {Have you/Has SP} ever had any teeth become loose on their own, without an injury

5. {Have you/Has SP} ever been told by a dental professional that {you/s/he} lost bone around {your/his/her} teeth?

6. During the past three months, {have you/has SP} noticed a tooth that doesn’t look right?

7. Aside from brushing {your/his/her} teeth with a toothbrush, in the last seven days, how many days did {you/SP} use dental floss or any other device to clean between {your/his/her} teeth?

8. Aside from brushing {your/his/her} teeth with a toothbrush, in the last seven days, how many days did {you/SP} use mouthwash or other dental rinse product that {you use/s/he uses} to treat dental disease or dental problems?
Preliminary Findings – NHANES 2009/10

<table>
<thead>
<tr>
<th># of questions</th>
<th>Total Periodontitis</th>
<th>CAL ≥ 3 mm</th>
<th>PD ≥ 4 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td># of questions</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>85%</td>
<td>94%</td>
<td>76%</td>
</tr>
<tr>
<td>Specificity</td>
<td>58%</td>
<td>31%</td>
<td>58%</td>
</tr>
<tr>
<td>ROC</td>
<td>0.81</td>
<td>0.82</td>
<td>0.75</td>
</tr>
</tbody>
</table>
ROC curve for periodontal diseases
CONCLUSION

- 1st time: Direct evidence for high burden of PD
- Moderate PD increases with age
- Severe & mild PD remain < 15% across all ages
- Disparities by SES and race/ethnicity
- Important implications for aging US population
- Data collection continues to 2014
- Self-report questions are promising based on NHANES 2009/2010 data.
Thank You