Exposure to Secondhand Smoke and the Development of Caries: NHANES 2011-2012

Deborah Mattheus PhD, MSN, CPNP, APRN
Assistant Professor of Nursing
Exposure to Secondhand Smoke and the Development of Caries: NHANES 2011-2012

Deborah Mattheus PhD, MSN, CPNP, APRN-Rx

• Disclosure:
  – Dr. Mattheus has no relevant financial or nonfinancial relationships to disclose.
Acknowledgements

School of Nursing & Dental Hygiene
Dr. Maureen Shannon CNM, FNP, PhD

John A. Burns School of Medicine
Eunjung Lim PhD
Krupa Gandhi MPH

KG and EL were partially supported by U54MD007584 from the National Institutes of Health (NIH). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.
Objectives

• Recognize the known risk factors associated with early childhood caries

• Describe the association found between a child’s exposure to secondhand smoke and the development of dental caries

• Identify the health consequences associated with exposure to secondhand smoke and caries development in children

• Describe the components of a successful oral health education program and methods for reducing secondhand smoke exposure for children
Oral Health

- Oral health is a key component of overall health and well-being of children

- Poor oral health has been associated with:
  - Cardiovascular disease
  - Respiratory infections
  - Diabetes mellitus
  - Preterm labor and births
  - Decrease quality of life
Childhood Caries Risk Factors

- Low SES
- Lack of fluoridation
- Limited parent education
- Maternal caries
- Poor oral hygiene
- Poor feeding habits
- Previous caries
Secondhand Smoke

• Over 1.1 billion adults are current smokers of cigarettes worldwide

• Smoking prevalence differs between countries in different environments

• Prevalence of smoking exposure varies among infants varies from 10% in Sweden to 60% in Greece, to 40% in the U.S. and 50-70% in South East Asia
Secondhand Smoke

• Half of all children are exposed to tobacco smoke
  – Majority of exposure occurs at home

• Effects of secondhand smoke on children
  – Respiratory infections
  – Cough
  – Asthma
  – Otitis media
  – Risk factor for SIDS
Biological Pathway: Smoke & Child Caries

- **Child**
  - Immature immune system
  - Decrease in Vitamin C
    - Enhanced bacterial growth
  - Decrease salivary flow
    - Limits tooth protection (fluoride)

- **Parent**
  - Increases parental cariogenic bacteria
Secondhand Smoke & Caries

• Aligne (2003)
  – Relationship between cotinine levels and caries (deciduous teeth)
  – Additional risk factors included poverty and low education

• Hanioka, Ojima, Tanaka, & Yamamoto (2011)
  – Systematic literature review: 15 studies (1 cohort, 14 case control)
  – Obvious dose-response relationship between level of ETS exposure and effect size (caries)
  – Possible evidence of environmental tobacco smoke exposure and caries formation in deciduous teeth but insufficient evidence for permanent teeth
Secondhand Smoke & Caries

- Tanaka, Shinzawa, Tokumasu, Seto & Kawakami (2015)
  - Retrospective cohort study: 76,920 children in Japan
  - ETS exposure at 4 month was associated with twofold increase in caries at age 3 years
  - Effects of maternal smoking (during pregnancy) was not significant
Study Purpose

To reinvestigate the association between a child’s exposure to secondhand smoke and the development of dental caries taking into account the child’s sugar intake, dental care experience and sociodemographic factors.
Methodology

- Cross-sectional data
- Household interviews
  - Demographics, dietary and health history
- Health examinations
  - Physical, dental and various lab tests
  - Children age 4-11 years
Methodology

- Dependent variable
  - Child’s dental caries status
    - Presence or absence of a tooth
      - Missing due to dental disease
      - Missing but replaced (removable or fixed)
      - Primary or secondary tooth with surface condition
Methodology

• Independent variables
  – Number of people smoking inside the house
  – Total # cigarettes smoked inside per day
  – Serum cotinine levels
  – Family
    ▪ Sociodemographic
    ▪ Behavioral factors (maternal)
  – Child
    ▪ Sugar intake
    ▪ Use of dental services
Analysis

• Descriptive statistics
• Bivariate analysis using Chi square
  – Determine associations with dental caries status
• Multivariable logistic regression accounting for NHANES’ complex sampling design
  – P<.01 in the bivariate association
Results

- Sample = 1,551 children age 4-11 yr
  - 52% had at least one missing tooth or tooth with surfaces changes
  - 13% (n=199) had smokers inside the home
    - 39% (n=77) had two or more smokers
- Significant results (bivariate)
  - Caries were more prevalent in those children with moderate (0.2-1.0 ng/ml) and high levels (>1 ng/ml) of serum cotinine
Results

- Children in homes with smokers (one or more/day)
  - 1.59 times more likely to have dental caries [95% CI (1.02-2.47), p=0.041]
Results

- Children living in family in low SES versus higher SES
  - 1.79 times more likely to have dental caries [95% CI(1.06-3.03), p=0.029]

- Children without any insurance
  - 2.50 times more likely to have caries than those with private insurance [95% CI(1.41-4.41), p=0.002]

- Children with Medicare/Medicaid
  - 1.67 more likely to have dental caries than those with private insurance [95% CI(1.08-2.58), p=0.021]
Question

Is this association biological in nature?

OR

Is this merely a marker of unhealthy habits in the home?
Caries are Preventable

• Education
  – Oral health habits
    ▪ Dietary intake
    ▪ Oral hygiene
• Interventions
  – Regular dental visits
  – Water fluoridation
  – Topical fluoride varnish
  – Dental sealants
Education: Infants

- Importance of primary teeth
- Reduce bacteria spread
- No bottles in the bed
- Reduce sweet drinks and foods
- Oral hygiene
  - Cleaning the mouth before teeth emerge
  - First tooth start brushing
  - Smear of fluoride toothpaste
Education: Young Child

• Brushing twice a day
• Fluoride toothpaste
  – Smear 1-3 years
  – Pea size amount 3-8 years
• Healthy eating
  – Limit sugary drinks and foods
• Visit the dentist
Education: The Missing Piece

Smoking Cessation

Among all current U.S. adult cigarette smokers, nearly 7 out of every 10 (68.8%) reported in 2010 that they wanted to quit smoking completely.

ASK about tobacco use at every visit
ADVISE all tobacco user to quit
ASSESS readiness to quit
ASSIST tobacco users with a plan
ARRANGE follow-up visits
Implications for Nursing Practice

• Oral health is a major health issue

• Children exposed to secondhand smoke risk
  – Caries development
  – Lung involvement
  – Increase rates of infections

• Education can be easily integrated into practice
  – Resources are readily available

• Desired outcomes should be family focused
  – Improvement in oral health
  – Improvement in systemic health
Thank You

Mahalo

Ngiyabonga

Enkosi

Dankie
References


References

References