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Diffusion of EXCELLENCE
Diffusing Best Practices Across VHA

The Oral MicroBiome Aspiration Pneumonia and Oral Care

Joseph Murray, PhD, CCC-SLP, FASHA

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Speaker Disclosure

- Financial:
  - None
- Non-Financial
  - None

- Acknowledgement:
  - Shannon Munro, PhD, APRN, BC, NP
    - Salem, Virginia VAMC

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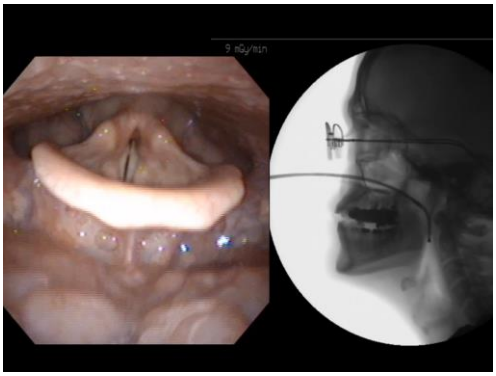

Hong Kong 2019 Joseph Murray/FEES

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Dysphagia 13:69–81 (1998)

Dysphagia
© Springer-Verlag New York Inc. 1998

Predictors of Aspiration Pneumonia: How Important Is Dysphagia?*

Susan E. Langmore, PhD,[1,2] Margaret S. Terpenning, MD,[1,3] Anthony Schork, PhD,[4] Yinmiao Chen, MS,[4] Joseph T. Murray, MA,[1] Dennis Lopatin, PhD,[5] and Walter J. Loesche, DMD, PhD[5]

[1]Veterans Affairs Medical Center, Ann Arbor, Michigan, [2]School of Dentistry, Department of Oral Medicine, Pathology, and Surgery, [3]School of Medicine, Department of Internal Medicine, Division of Geriatric Medicine, [4]School of Public Health, and [5]School of Dentistry, Department of Biologic and Materials Science, University of Michigan, Ann Arbor, Michigan, USA

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Langmore et al. 1998

- Odds Ratios for Aspiration Pneumonia
  - Dependent for feeding
  - Dependent for oral care
  - Number of decayed teeth
  - Tube feeding
- Dysphagia was an important risk for aspiration pneumonia
  - but generally not sufficient to cause pneumonia unless other risk factors were present

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Microbiome

- Microbiome
  - The community of microorganisms that can usually be found living together in any given habitat
- Human Microbiome
  - The full array of microorganisms (the microbiota) that live on and in humans

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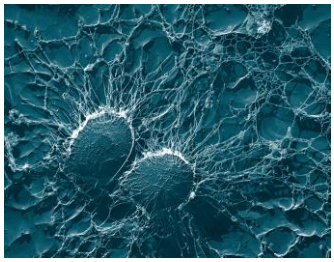

The Oral Biome

- **The oral microbiome contains a massive diversity of organisms**
- **The full diversity of the biome is unknown**
- **It may be unknowable**

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JOURNAL OF CLINICAL MICROBIOLOGY, Nov. 2005, p. 5721–5732 Vol. 43, No. 11
0095-1137/05/$08.00+0 doi:10.1128/JCM.43.11.5721–5732.2005

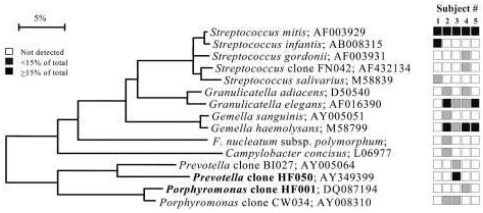
Defining the Normal Bacterial Flora of the Oral Cavity

Jørn A. Aas,[1,2]* Bruce J. Paster,[1,3] Lauren N. Stokes,[1] Ingar Olsen,[2] and Floyd E. Dewhirst[1,3]

Department of Molecular Genetics, The Forsyth Institute,[1] and Faculty of Dentistry,[2] University of Oslo, Oslo, Norway, and Department of Oral and Developmental Biology, Harvard School of Dental Medicine, Boston, Massachusetts[3]

9

Maxillary and anterior vestibule



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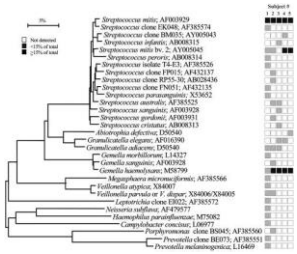
Buccal epithelium



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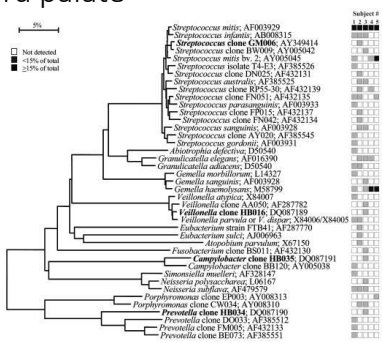
Hard palate



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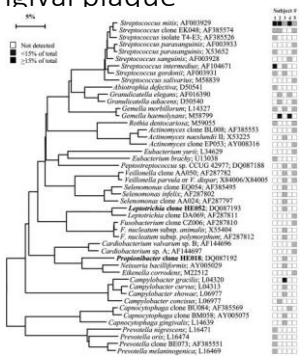
Subgingival plaque



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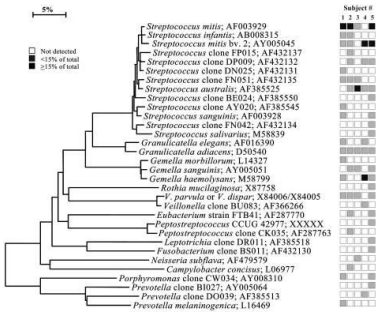
Lateral tongue surface



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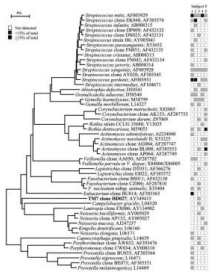
Tooth surface



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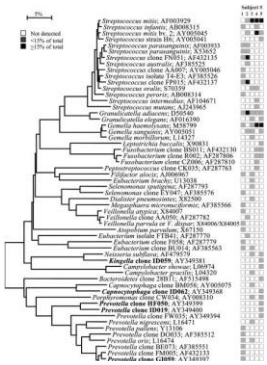
Tonsils



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Tongue surface

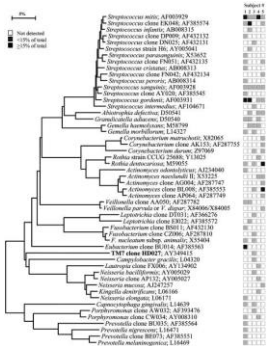

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TABLE 1.
Number of predominant bacterial species per site and subject

Subject no.	Total no. of species/site						
	Buccal	Maxillary vestibule	Tongue dorsum	Tongue lateral	Hard palate	Soft palate	Tonsils
1	20	5	23	14	21	16	28
2	12	6	13	18	18	20	14
3	11	9	10	9	15	14	22
4	5	7	10	8	4	6	11
5	4	3	17	20	6	13	18
Total	32	15	40	34	42	38	59

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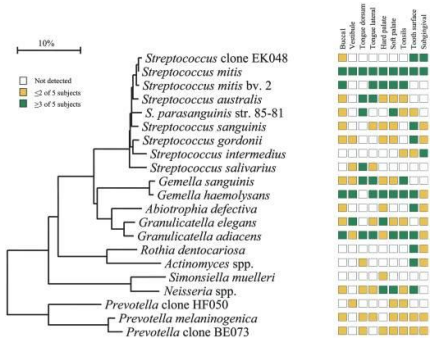
Site Specificity



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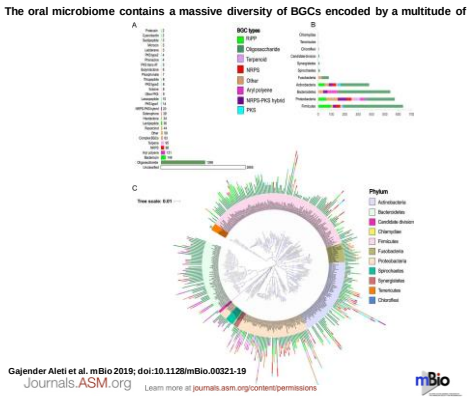

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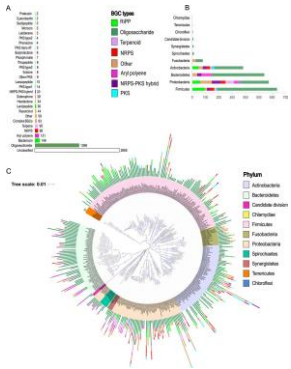

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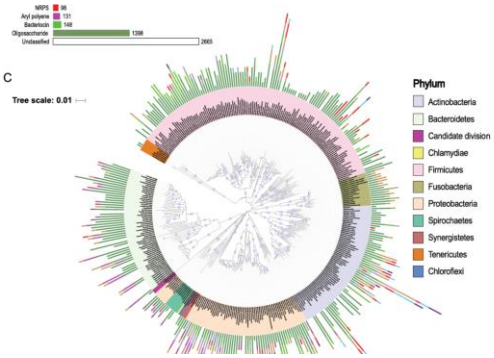

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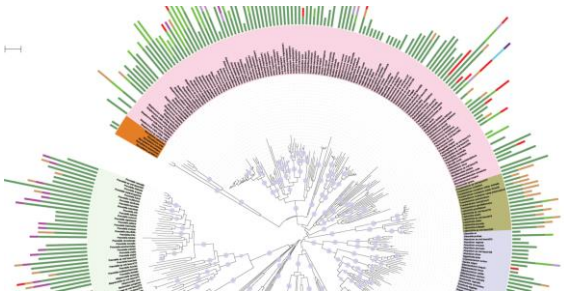

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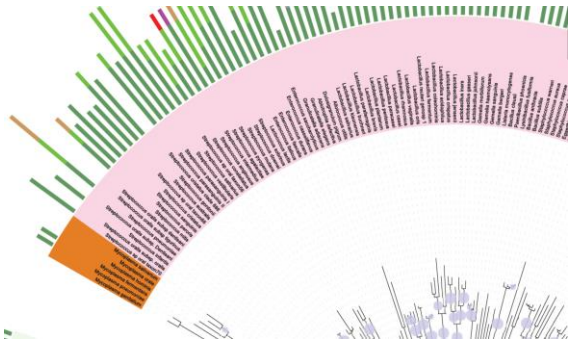

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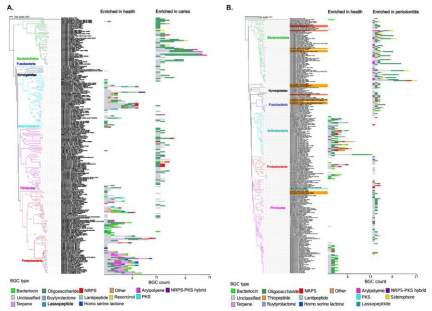
Overview of differentially represented biosynthetic pathways in oral bacterial genomes in oral health and disease states based on metagenomic data sets.



Gajender Aleti et al. mBio 2019; doi:10.1128/mBio.00321-19

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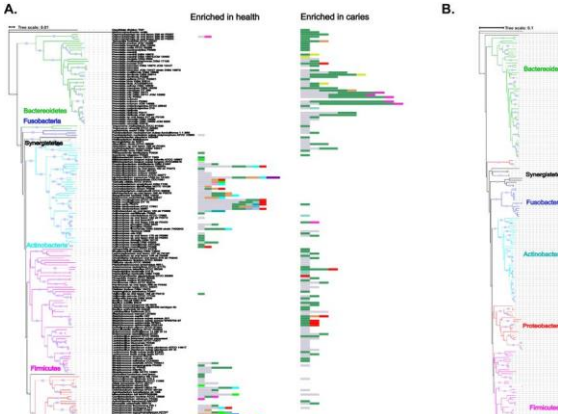

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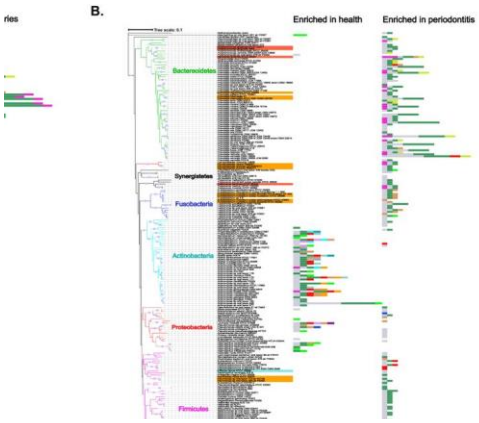

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IJC
International Journal of Cancer

Periodontal pathogens are a risk factor of oral cavity squamous cell carcinoma, independent of tobacco and alcohol and human papillomavirus

Ian Ganly[1], Liying Yang[2,3], Rachel A. Giese[1], Yuhan Hao[2,4,5], Carlos W. Nossa[6], Luc G.T. Morris[1], Matthew Rosenthal[1], Jocelyn Migliacci[1], Dervla Kelly[2], Wenzhi Tseng[2], Jiyuan Hu[7], Huilin Li[7], Stuart Brown[8] and Zhiheng Pei[2,8]

[1]Head and Neck Service, Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY
[2]Department of Pathology, New York University School of Medicine, New York, NY
[3]Department of Medicine, New York University School of Medicine, New York, NY
[4]Applied Bioinformatics Laboratories, New York University School of Medicine, New York, NY
[5]Center for Genomics and Systems Biology, Department of Biology, New York University, New York, NY
[6]Ascend Genetics, Bellaire, TX
[7]Department of Population Health and the Department of Environmental Medicine, New York, NY
[8]Department of Veterans Affairs New York Harbor Healthcare System, New York, NY

- Certain periodontal pathogens encourage the growth of other pathogens
- These same bacteria suppress the growth of certain other pathogens
- These patterns of growth are associated with oral cancers.

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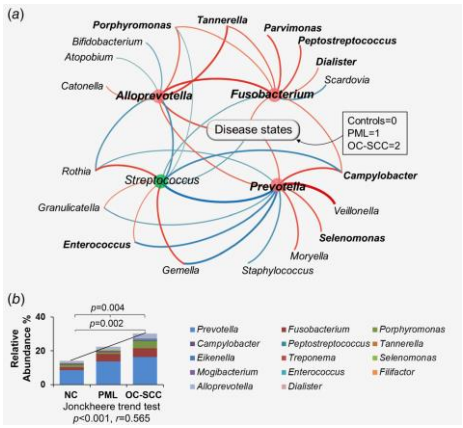

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Oral Secretions

- Warm and humidify the air
- Providing a complex physical and biological barrier
- Provide protection against mechanical, thermal and chemical irritation
- Facilitate remineralization of teeth
- Antimicrobial by clearing pathogens from the oral cavity
- Initiate chemical digestion
- Enable taste.

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Oral Health and Saliva

- Play a critical role in maintaining oral health
  - Protecting of the oral mucosa
  - Reducing demineralization and facilitating remineralization of teeth
  - Sustaining a balanced oral biome
  - Facilitating antimicrobial actions and clearance of pathogens

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Saliva Production

- Produced in and secreted from salivary glands Contains
  - Water
  - Electrolytes
  - Mucins
  - Enzymes
- *Serous cells*
  - secrete a watery fluid, essentially devoid of mucus
- *Mucous cells*
  - produce a very mucin-rich secretion

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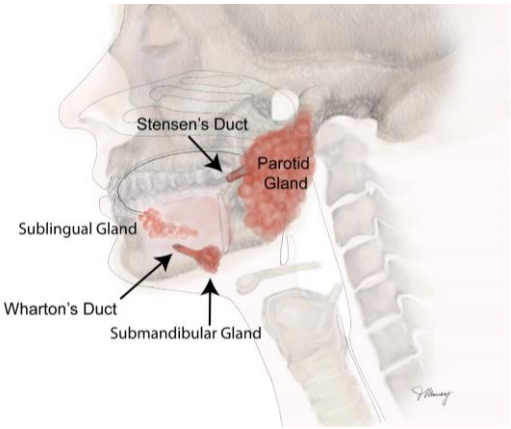

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Salivary Secretions

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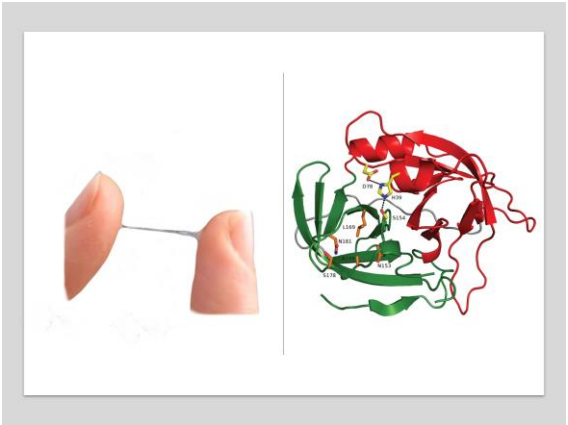

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Mucins

Long chain proteins

- **Coat epithelial surfaces throughout the enteral system**
- **Secreted into saliva**
- Serves as a diffusion barrier against contact with noxious substances
- Lubricates to minimize shear stresses
  - Super lubricant!

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Mucin Secretions and Spinnbarkeit

- Mucin rich secretions
  - Lubricate
  - Stretch and bond to one another
- Spinnbarkeit
  - Forms a tangled grid or web
  - Coats the epithelial surfaces of the mouth and pharynx
  - Typically present as thin film (70 to 100 micrometers)
    - Thickest on the posterior tongue
    - Thinnest on the hard palate
  - Minimizes shear stresses during mastication
    - Allows for less effort in masticatory cycles.

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Mastication and Secretions

- During mastication:
  - More secretions produced
  - Adds moisture to food being masticated
  - Frees mucins from spinnbarkeit to food
    - Enhances lubrication of bolus
- During Rest
  - Saliva secreted in:
    - Smaller volumes
    - Greater density of mucins
      - Reformation of spinnbarkeit

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Hyposalivation and the Oral Biome

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Hyposalivation and Xerostomia

- Often used interchangeably
  - Should not be
  - Often do not co-occur
- Hyposalivation
  - Measurably reduced saliva output
- Xerostomia
  - Perception of oral dryness
    - A symptom that someone may report to you
- Patients with xerostomia may not have objective signs of hyposalivation
- Hypothesized that saliva may not be evenly distributed
  - Focal area of dryness might result in sensation of oral dryness regardless of volume of saliva in oral cavity

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Hyposalivation

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Hyposalivation

- Reduction in the volume of saliva can lead to:
  - Derangement of oral biome
  - Long-term problems in oral discomfort during mastication
  - Loss of taste
  - Declination in swallow function
  - Increased susceptibility to dental caries
  - Oral infections
- Salivary gland hypofunction
  - Acquired or developmental
    - Sjögren's syndrome
    - Age related
    - Alzheimer's disease
  - Iatrogenic
    - Medication side-effect
    - Radiation treatment
    - Surgery to head and neck

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Secretory Immunoglobulins

- Heavy plasma proteins
  - Recognize pathogens
  - Bind with protiens in the pathogen
  - Kill it directly
  - Block and bundle toxins

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Saeb, A. T., Al-Rubeaan, K., Aldosary, K., Raja, U., Mani, B., Abouelhoda, M., & Tayeb, H. (2018). Relative Reduction of the Biological and phylogenetic diversity of oral microbiome in diabetic and pre-diabetic subjects. *bioRxiv*, 406736.

- Subjects:
  - Normoglycemic/healthy (NG)
  - Impaired glucose tolerance (IGT)
  - Diabetic (T2D)
- Differences in the number of species in the oral biome
  - NG=502
  - IGT=412
  - T2D=372

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Hyposalivation and Diabetes

- Diabetic and Pre-diabetic subjects:
  - Higher glucose concentration in saliva
    - Enhances certain bacterial species at the expense of others
    - Reduction in the diversity of the microbial population
    - Acidification of the oral environment because of hyperglycemia
  - Type 2 diabetic patients
    - Microbiome distribution different
      - Highest rate of pathogenic organisms
      - Without probiotic microorganisms
        - Organisms that promote the growth of "good bacteria"

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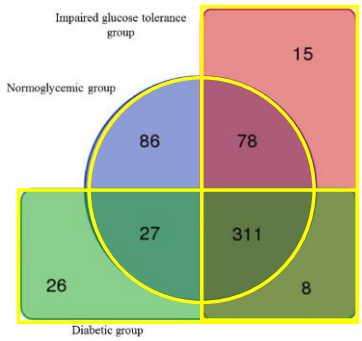

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Dental Plaque

- One cubic millimeter of dental plaque contains about 100 million bacteria
- Oral bacterial load increases during intubation
- Higher dental plaque scores predict risk of pneumonia

Munro CL, Grap MJ, Elswick RK Jr (2006). Oral health status and development of ventilator-associated pneumonia: a descriptive study. : 453–460.

Photo by Jost Jahn, https://commons.wikimedia.org/w/index.php?curid=56033606

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Zhu Y, Hollis JH. Associations between the number of natural teeth and metabolic syndrome in adults. J Clin Periodontol 2015; 42: 113–120

Adult subject (n = 5511)

Four groups by number of natural teeth

full dentition

21–27 teeth

1–20 teeth

Edentulous

Results

Tooth loss was significantly associated with metabolic syndrome (p = 0.002).

Odds:

32% higher in those with 21–27 teeth

55% higher in those with 1–20 teeth

79% higher in edentulous participants

Number of natural teeth inversely associated with body mass index (p < 0.01)

Conclusions

The number of natural teeth is inversely associated with the presence of metabolic syndrome in adults.

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The Lungs

Relatively pristine

May experience microbial immigration:

- Microaspiration
- Inhalation of bacteria
- Dispersion of microbes over mucosa

Mechanisms for elimination of microbes from the lungs

- Cough
- Mucocilliary clearance
- Host defenses.

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Oral Colonization and Pneumonia

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GOMES-FILHO, I., PASSOS, J., SEIXAS DA CRUZ, S.. Respiratory disease and the role of oral bacteria. **Journal of Oral Microbiology**, North America, 2, Dec. 2010.

- **Biological mechanisms involved between oral conditions and respiratory diseases**
- **Four possible mechanisms**
  - **Oral pathogens directly aspirated into the lungs**
  - **Salivary enzymes associated with periodontal disease modify respiratory tract mucosal surfaces**
  - **Enzymes from periodontopathic bacteria destroy salivary film that protects against pathogenic bacteria**
  - **Cytokines**

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El-Solh, A et al. Colonization of Dental Plaques*: A Reservoir of Respiratory Pathogens for Hospital-Acquired Pneumonia in Institutionalized Elders. Chest; November 2004 Vol 126(5) pp 1575-1582

- Association between dental plaque colonization and lower respiratory infection in elderly using molecular genotyping
- 49 critically ill LTC residents requiring ICU
  - Plaque index scores
  - Quantitative cultures
  - BAL on 14 patients who developed pneumonia
    - Respiratory pathogens compared genetically to plaques by pulse gel electrophoresis

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El-Sohl et al. cont

- 28/49 (57%) had colonization of plaque with aerobic pathogens
  - Staphylococcus aureus (45%)
  - Gram-negative bacilli (42%)
  - Pseudomonas aeruginosa (13%)
- Isolates from BAL fluid
  - 9/13 matched genetically those recovered from corresponding dental plaques of 8 patients

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Oral pathogens directly aspirated into the lungs

- *Pseudomonas aeruginosa*
  - Opportunistic pathogen with ability to develop resistance to antibiotics
- Ventilator acquired pneumonia with P. aeruginosa
  - higher mortality compared with other pathogens
- Chastre J, Fragon J-Y. Ventilator-associated pneumonia. *Am J Respir Crit Care Med* 2002;165:867–903.
  - Increased colonization of the oropharynx of patients with nasogastric tubes
- Leibovitz A, Dan M, Zinger J, Carmeli Y, Habot B, Segal R. Pseudomonas aeruginosa and the oropharyngeal ecosystem of tube-fed patients. *Emerg Infect Dis* 2003;9:956–959

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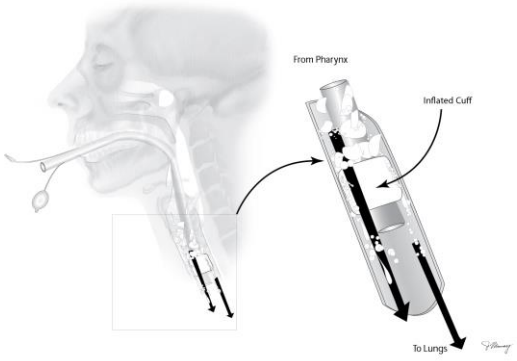

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ORIGINAL RESEARCH

Spatial Variation in the Healthy Human Lung Microbiome and the Adapted Island Model of Lung Biogeography

Robert P. Dickson[1], John R. Erb-Downward[1], Christine M. Freeman[1,2], Lisa McCloskey[1], James M. Beck[3,4], Gary B. Huffnagle[1,2*], and Jeffrey L. Curtis[1,4*]

[1]Department of Internal Medicine, Division of Pulmonary and Critical Care Medicine, University of Michigan Medical School, Ann Arbor, Michigan; [2]Research Service, Veterans Affairs Ann Arbor Healthcare System, Ann Arbor, Michigan; [3]Veterans Affairs Eastern Colorado Health Care System, Denver, Colorado; [4]Department of Medicine, Division of Pulmonary Sciences and Critical Care, University of Colorado School of Medicine, Aurora, Colorado; [5]Department of Microbiology and Immunology, University of Michigan Medical School, Ann Arbor, Michigan; and [6]Pulmonary and Critical Care Medicine Section, Medical Service, Veterans Affairs Ann Arbor Healthcare System, Ann Arbor, Michigan

- 15 healthy volunteers
  - Genetic sequencing of microbes in lungs
- Bacteria move in and are removed
- No real reproduction
- In people with damaged lungs
  - The ecosystem is much more hospitable for the reproduction of bacteria.

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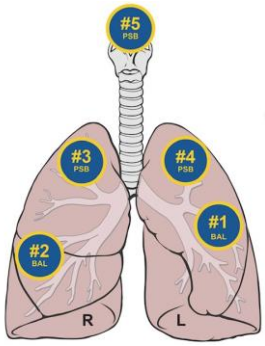

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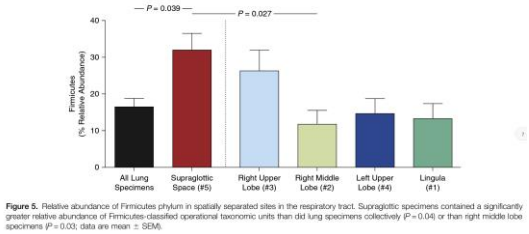

Figure 5. Relative abundance of Firmicutes phylum in spatially separated sites in the respiratory tract. Supraglottic specimens contained a significantly greater relative abundance of Firmicutes-classified operational taxonomic units than did lung specimens collectively ($P = 0.04$) or than right middle lobe specimens ($P = 0.03$; data are mean ± SEM).

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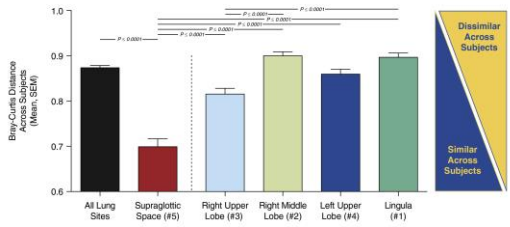

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Pneumonia: "Adapted Island Model"

- Madagascar or Antarctica?
  - Healthy subjects are like Antarctica
    - People (organisms) move in and out but don't reproduce there
  - Uniform bacterial populations throughout lungs
  - Ecology constantly "seeded" from a "source community" in mouth
    - No real reproduction
  - Unhealthy subjects are like Madagascar
    - Disease (e.g., COPD) prevents movement of bacteria out of lungs – bacteria can thrive and reproduce
    - Constant re-seeding from mouth results in reproduction
      - If conditions are right, development of pneumonia

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Distress Signals in Pneumonia

- Catecholamines
  - Cytokines that are produced by cells to signal the body that an infection is occurring
  - Bacteria and immune defenses "speak the same language" creating a "feedback loop"
    - Some bacteria grow faster when exposed to these signals
  - Vicious cycle:
    - Bacteria expresses its presence in lungs
    - White blood cells (neutrophils) release Catecholamines
    - Bacteria grows faster causing inflammation
    - Inflammation results in greater catecholamine release
    - Bacteria grows faster

Kellum et al. Understanding inflammatory cytokine response in pneumonia and sepsis. JAMA Internal Med. 2007;167(15):1655-1663

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Aspiration Pneumonia

- Feedback loop between bacteria and immune defenses
  - Some pathogens grow faster when exposed to white blood cells.
  - Invading biome causes increased inflammation
  - Triggers continued signals to produce white blood cells
- Looping interaction:
  - Advanced to the point of inflammation and infection
    - Pneumonia

OR

  - Terminated with a combination of immune response and dislocation of the offending pathogens through mucocilliary elevation

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Reflection

- Oral Biome
  - Array and variation still in discovery
  - Effect on overall health is palpable in early studies
    - Still in a state of discovery
- Initial work by Langmore and colleagues (1998)
  - Predicted future discovery
  - Paved a path for investigation into relationships
    - Oral health markers and pneumonia
    - Oral care and mitigation of aspiration pneumonia

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VA | U.S. Department of Veterans Affairs

Diffusion of EXCELLENCE
Diffusing Best Practices Across VHA

An Update on Oral Care

Joseph Murray, PhD, CCC-SLP, FASHA

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Speaker Disclosures

- Financial:
  - None
- Nonfinancial:
  - None

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Dysphagia 13:69–81 (1998)

Dysphagia
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Predictors of Aspiration Pneumonia: How Important Is Dysphagia?*

Susan E. Langmore, PhD,[1,2] Margaret S. Terpenning, MD,[1,3] Anthony Schork, PhD,[4] Yinmiao Chen, MS,[4] Joseph T. Murray, MA,[1] Dennis Lopatin, PhD,[5] and Walter J. Loesche, DMD, PhD[2]

[1]Veterans Affairs Medical Center, Ann Arbor, Michigan, [2]School of Dentistry, Department of Oral Medicine, Pathology, and Surgery, [3]School of Medicine, Department of Internal Medicine, Division of Geriatric Medicine, [4]School of Public Health, and [5]School of Dentistry, Department of Biologic and Materials Science, University of Michigan, Ann Arbor, Michigan, USA

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The JAMA Network

From: **Daily Oral Care and Risk Factors for Pneumonia Among Elderly Nursing Home Patients**

JAMA. 2001;286(18):2235-2236. doi:10.1001/jama.286.18.2233

Table. Effect of

Risk Factor	Day 30
LTSR, s	4.2 (0.7)†
SP, pg/mL	22.0 (4.1)‡
ADL score	9.7 (1.4)‡
MMSE score	15.5 (1.8)

*Values are express… repeated-measur… reflex; SP, substa… day 30 by 2-way, … time of swallowing
†P<.001.
‡P<.05.

frontiers in Neurology
ORIGINAL RESEARCH
published: 16 April 2019
doi: 10.3389/fneur.2019.00386

Substance P Saliva Reduction Predicts Pharyngeal Dysphagia in Parkinson's Disease

Jens Burchard Schröder, Thomas Marian, Inga Claus, Paul Muhle, Matthias Pawlowski, Heinz Wiendl, Sonja Suntrup-Krueger, Sven G. Meuth, Rainer Dziewas, Tobias Ruck and Tobias Warnecke*

Department of Neurology, University Hospital Münster, Münster, Germany

Yoshino, A., Ebihara, T., Ebihara, S., Fuji, H., & Sasaki, H. (2001). Daily oral care and risk factors for pneumonia among elderly nursing home patients. *Jama*, *286*(18), 2235-2236.

Table. Effect of Oral Care on Risk Factors for Pneumonia*

73

Yoneyama T, Yoshida M, Ohrui T, Okamoto H, Hishiba K et al. (2002) Oral care reduces pneumonia in older patients in nursing homes Journal of the American Geriatrics Society,50 3 430

- 417 patients randomly assigned to one of two groups
  - Oral Care Group
    - Nurses or caregivers cleaned the patients' teeth by toothbrush after each meal.
    - Swabbing with iodine was additionally used in some cases.
    - Dentists or dental hygienists provided professional care once a week.
  - Significant decrease in:
    - Pneumonia
    - febrile days
    - death from pneumonia

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Yoneyama T, Yoshida M, Ohrui T, Okamoto H, Hishiba K et al. (2002) Oral care reduces pneumonia in older patients in nursing homes Journal of the American Geriatrics Society,50 3 430

JAGS MARCH 2002–VOL. 50, NO. 3 ORAL CARE AND PNEUMONIA 433

Table 4. Comparisons Between Oral Care and No Oral Care Groups in Dentate and Edentate Patients

Patients	Group	Number of Patients	Age, Years, mean ± SD	F/M	ADLs at Baseline, mean ± SD	MMSE at Baseline, mean ± SD	Number of Patients with Fever (%)	Number of Patients with Pneumonia (%)	Number of Patients Dying (%)
Dentate	Oral care	109	79.9 ± 7.9	82/27	17.1 ± 6.3	14.8 ± 8.5	13** (11)	12** (9)	8* (6)
	No oral care	99	79.3 ± 7.6	80/19	16.7 ± 6.8	15.3 ± 9.9	26 (26)	19 (21)	20 (20)
Edentate	Oral care	75	84.3 ± 7.4	63/12	15.8 ± 6.5	12.7 ± 7.8	14* (18)	9 (9)	6 (7)
	No oral care	83	84.9 ± 7.1	68/15	16.0 ± 6.9	12.4 ± 9.2	28 (34)	15 (20)	10 (13)

*P < .05 and **P < .01 show significant differences between groups with oral care and no oral care.
SD = standard deviation; F/M = female/male; ADLs = activities of daily living; MMSE = Mini-Mental State Examination.

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Gerodontology
Review article

Oral health care and aspiration pneumonia in frail older people: a systematic literature review

Claar D. van der Maarel-Wierink[1,2], Jackie N.O. Vanobbergen[1,3], Ewald M. Bronkhorst[4], Jos M. G. A. Schols[1,5] and Cees de Baat[1,2]

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Table 3 Conclusions of the five intervention studies.

Study	*Conclusions*
Yoshino *et al.*[16]	Assistance with oral health care after each meal was associated with significant decreases in swallowing latency time, suggesting a reduction in the risk of aspiration pneumonia.
Yoneyama *et al.*[17]	Cleaning the mouth by care providers during 5 min after each meal and in some cases with the addition of 1% povidone iodine, resulted in significant higher incidences of febrile days, pneumonia, and dying from pneumonia in the control group.
Watando *et al.*[18]	Cleaning the mouth by care providers during 5 min after each meal resulted in significant improvement of cough reflex sensitivity, suggesting a reduction in the risk of aspiration pneumonia.
Bassim *et al.*[19]	The assignment of an oral hygiene aid in care home wards led to a 3-fold risk reduction for dying from pneumonia when compared to the control group.
Ishikawa *et al.*[20]	The levels of potential respiratory pathogens decreased or disappeared after weekly professional oral health care. Gargling after lunch with povidone iodine showed to be less effective than professional oral health care.

According to the results of the current systematic literature review oral health care, consisting of tooth brushing after each meal, cleaning dentures once a day, and professional oral health care once a week, seems the best intervention to reduce the incidence of aspiration pneumonia.

77

Kaneoka, A., Pisegna, J. M., Miloro, K. V., Lo, M., Saito, H., Riquelme, L. F., ... & Langmore, S. E. (2015). Prevention of Healthcare-Associated Pneumonia with Oral Care in Individuals Without Mechanical Ventilation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Infection Control & Hospital Epidemiology*, 1-8.

- Effect of any method of oral care on reported incidence of pneumonia and/or fatal pneumonia
- 8 databases searched.
  - Relative risks (RR) and 95% confidence intervals were calculated
  - Risk of bias was assessed for eligible studies

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Kaneoka, A., Pisegna, J. M., Miloro, K. V., Lo, M., Saito, H., Riquelme, L. F., ... & Langmore, S. E. (2015). Prevention of Healthcare-Associated Pneumonia with Oral Care in Individuals Without Mechanical Ventilation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Infection Control & Hospital Epidemiology*, 1-8.

- 5 studies met inclusion criteria
  - 2 trials assessed the effect of chlorhexidine in hospitalized patients
  - 3 studies examined mechanical oral cleaning in nursing home residents
- Meta-analysis on 4 trials
  - Significant risk reduction in pneumonia through oral care interventions (RR, 0.61; 95% CI, 0.40–0.91; *P*=.02)
  - Mechanical oral care alone when pooled across studies
  - (RR, 0.61; 95% CI, 0.40–0.92; *P*=.02)
  - Reduction of fatal pneumonia from mechanical oral cleaning
  - (RR, 0.41; 95% CI, 0.23–0.71; *P*=.002)
- CONCLUSIONS
- Preventive effect of oral care on pneumonia in non-ventilated individuals

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Neurogastroenterology & Motility
Neurogastroenterol Motil (2015) doi: 10.1111/nmo.12690

High prevalence of colonization of oral cavity by respiratory pathogens in frail older patients with oropharyngeal dysphagia

O. ORTEGA,*,† O. SAKWINSKA,†,# S. COMBREMONT,† B. BERGER,† J. SAUSER,† C. PARRA,‡ S. ZARCERO,‡ J. NART,‡ S. CARRIÓN* & P. CLAVÉ*,§

*Unitat d'Exploracions Funcionals Digestives, Departament de Cirurgia, Hospital de Mataró, Universitat Autònoma de Barcelona, Mataró, Spain
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§Centro de Investigación Biomédica en Red de enfermedades hepáticas y digestivas (CIBERehd), Instituto de Salud Carlos III, Barcelona, Spain

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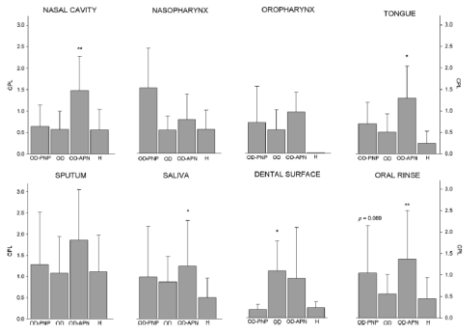

Figure 5 Pathogen load measured with the CFL in all groups and locations. OD-PNP, patients with oropharyngeal dysphagia and prior pneumonia; OD, patients with oropharyngeal dysphagia; OD-APN, patients with acute pneumonia and oropharyngeal dysphagia; H, healthy older persons. *p*-values are for comparison of a given group with healthy older persons. $^{*}p < 0.05$, $^{**}p < 0.01$.

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Table 2 Oral hygiene and health of the study groups

	G1 OD-PNP	G2 OD	G3 OD-APN	G4 H	*p*-value
Subjects	14	13	11	13	
Edentulism [%]	35.7 (5)	15.4 (2)	27.3 (3)	7.7 (1)	ns
Number of teeth	16.22 ± 8.6	18.6 ± 10.1	18.11 ± 6.8	21.17 ± 6.2	ns
OHI-S	3.13 ± 1.5	3.4 ± 1.1	3.26 ± 1.5	2.54 ± 1.3	ns
0–1 [good] [%]	11.1 (1)	0	14.3 (1)	16.7 (2)	ns
1.1–3 [fair] [%]	33.3 (3)	45.5 (5)	14.3 (1)	58.3 (7)	
3.1–6 [poor] [%]	55.6 (5)	54.5 (6)	71.4 (5)	25 (3)	
Plaque [%]	60.25	58.49	55.86	68.68	ns
Calculus [%]	39.75	41.51	44.14	31.32	ns
Oral diseases					
Healthy [%]	11.11 (1)	9.09 (1)	0	8.33 (1)	ns
Gingivitis [%]	0	0	0	0	ns
Periodontitis [%]	88.9 (8)	90.9 (10)	87.5 (7)	91.7 (11)	ns
Caries [%]	77.8 (7)	72.7 (8)	85.71 (6)	50 (6)	ns
Oral habits [persons]	5	11	10	9	
Tooth brushing [≥1/day] [%]	60 (3)	63.63 (7)	60 (6)	88.9 (8)	ns
Denture cleaning [≥1/day] [%]	40 (2)	45.5 (5)	30 (3)	33.3 (3)	ns
Last visit dentist [≤1 year] [%]	40 (2)	27.27 (3)	20 (2)	55.6 (5)	ns

OD-PNP, patients with oropharyngeal dysphagia and prior pneumonia; OD, patients with oropharyngeal dysphagia; OD-APN, patients with acute pneumonia and oropharyngeal dysphagia; H, healthy older persons.

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Terpenning M, Taylor GW, Lopatin DE, et al. Aspiration pneumonia: dental and oral risk factors in an older veteran population. J Am Geriatr Soc 2001; 49:557-563

- 134 Geriatric patients
  - Dentate patients with pneumonia
    - 27% of inpatients
    - 19% of LTC
  - Edentulous patients with pneumonia
    - 5%

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NEW: Eligible for 1 hour of CE Credit

ACP AMERICAN COLLEGE OF PROSTHODONTISTS

Dentures are a Reservoir for Respiratory Pathogens

Lindsay E. O'Donnell, BSc,[1] Karen Smith, BSc, PhD,[2] Craig Williams, MB, MD,[2] Chris J. Nile, BSc, PhD,[1] David F. Lappin, BSc, PhD,[1] David Bradshaw, BSc, PhD,[3] Margaret Lambert, BSc, MSc,[3] Douglas P. Robertson, PhD, BDS (Hons), MFDS, FHEA,[1] Jeremy Bagg, PhD, FDS, FRCPath, FFPH,[1] Victoria Hannah, BSc, BDS, PhD,[1] & Gordon Ramage, BSc, PhD, FRCPath[1]

[1]Infection and Immunity Research Group, Glasgow Dental School, School of Medicine, College of Medical, Veterinary and Life Sciences, University of Glasgow, UK
[2]Institute of Healthcare Associated Infection, School of Health, Nursing and Midwifery, University of the West of Scotland, Paisley, UK
[3]GlaxoSmithKline, Weybridge, Surrey, UK

The article is associated with the American College of Prosthodontists' journal-based continuing education program. It is accompanied by an online continuing education activity worth 1 credit. Please visit www.wileyhealthlearning.com/jopr to complete the activity and earn credit.

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SCIENTIFIC REPORTS
nature research

OPEN

Infrequent Denture Cleaning Increased the Risk of Pneumonia among Community-dwelling Older Adults: A Population-based Cross-sectional Study

Received: 10 July 2019
Accepted: 6 September 2019
Published online: 24 September 2019

Taro Kusama[1], Jun Aida[1], Tatsuo Yamamoto[2], Katsunori Kondo[1,3] & Ken Osaka[1]

n (%)	All participants (n = 70,501)		65–74 years (n = 35,062)		≥75 years (n = 35,439)	
	Frequency of denture cleaning		Frequency of denture cleaning		Frequency of denture cleaning	
	Daily	Non-daily	Daily	Non-daily	Daily	Non-daily
Incidence of pneumonia within the last one year						
Yes	1,547 (2.3)	100 (3.0)	575 (1.7)	34 (1.9)	972 (2.9)	66 (4.3)
No	65,661 (97.7)	3,193 (97.0)	32,733 (98.3)	1,720 (98.1)	32,928 (97.1)	1,473 (95.7)

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Hand Dexterity and Oral Hygiene

- Padilha DMP, Hugo FN, Hilgert JB . Hand function and oral hygiene in Brazilian institutionalized elderly. J Am Geriatr Soc 2007;:1333–1338.
  - 49 institutionalized participants
    - 29 dentate
    - 36 one complete denture
  - Poor hand function (Purdue Test of Dominant Hand Function)
    - Dentate
      - Correlated with significantly more dental plaque
    - Complete denture wearers
      - Correlated with significantly more denture plaque

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International Journal of Environmental Research and Public Health

MDPI

Article

Effect of an Oral Health Programme on Oral Health, Oral Intake, and Nutrition in Patients with Stroke and Dysphagia in Taiwan: A Randomised Controlled Trial

Hsiao-Jung Chen [1], Jean-Lon Chen [2,3], Chung-Yao Chen [3,4], Megan Lee [5], Wei-Han Chang [2] and Tzu-Ting Huang [6,7,*]

- Patients with first time stroke
- Randomized to
  - Oral health training with swallowing training
  - No oral health training with swallowing training
- Outcome measures:
  - FOIS
  - Nutritional status
  - Rate of NG tube removal

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Chen et al. 2019

- Oral health training
  - Significant improvement in oral health (p<.001)
- FOIS
  - Higher but not significant in treatment group
- NG tube removal
  - 21.% in treatment group
  - 6.1% in no-treatment group

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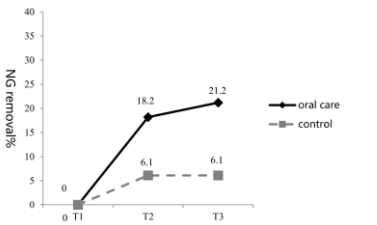

Figure 5. Changes in the percentage of nasogastric tubes removed in the two groups at three time points (T1–T3).

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Hollaar et al. BMC Geriatrics (2017) 17:128
DOI 10.1186/s12877-017-0519-z

BMC Geriatrics

RESEARCH ARTICLE Open Access

The effect of a daily application of a 0.05% chlorhexidine oral rinse solution on the incidence of aspiration pneumonia in nursing home residents: a multicenter study

Vanessa R. Y. Hollaar[1,2,3*], Gert-Jan van der Putten[2,3,4], Claar D. van der Maarel-Wierink[2,5], Ewald M. Bronkhorst[6], Bert J. M. de Swart[1,7] and Nico H. J. Creugers[3]

Abstract

Background: Dysphagia and potential respiratory pathogens in the oral biofilm are risk factors for aspiration

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Hollaar et l. 2017

- Daily application of 0.05% chlorhexidine oral rinse
  - Outcome:
    - Aspiration pneumonia
    - Survival rate
    - FOIS
  - Usual oral hygiene + chlorhexidine
    - N=52
  - Usual oral hygiene
    - N=51
- Result:
  - No significant difference in pneumonia (p=0.517)
  - FOIS-level showed increased risk for pneumonia (p=0.036)

92

Lam, O. L., McMillan, A. S., Samaranayake, L. P., Li, L. S., & McGrath, C. (2013). Effect of oral hygiene interventions on opportunistic pathogens in patients after stroke. *American journal of infection control*, *41*(2), 149-154.

- RCT
  - 102 patients undergoing hospital-based rehabilitation for stroke randomized to one of 3 groups
    - oral hygiene instruction (OHI) only
    - OHI and 0.2% chlorhexidine mouth rinse twice daily
    - OHI, 0.2% chlorhexidine mouth rinse twice daily, and assisted brushing twice weekly.
- Results
  - No significant differences among the 3 groups

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J Nutr Health Aging. 2018;22(6):739-747

Table 3

Incidence Rate and Incidence Rate Ratio for different types of readmissions between the study (MMI) and control group

	Incidence Rate: Readmissions/100 persons-year (95% CI)	Incidence Rate Ratio (95% CI)	p-value
All readmissions		2.78 (1.50 – 5.15)	0.001
MMI	68.8 (28.1 – 109.38)		
Controls	190.8 (156.0 – 225.7)		
Readmissions for PN		0.62 (0.16 – 2.40)	0.4468
MMI	18.75 (0 – 39.97)		
Controls	11.62 (3.01 – 20.22)		
Readmissions for LRTI		5.97 (1.45 – 24.63)	0.0020
MMI	12.50(0 – 29.82)		
Controls	74.68 (52.86 – 96.50)		
Readmissions for other causes		2.79 (1.21 – 6.44)	0.011
MMI	37.5 (7.49 – 67.51)		
Controls	104.55 (78.73 – 130.37)		

PN: Pneumonia; MMI: Minimal-Massive Intervention; LRTI: Lower Respiratory Tract Infections.

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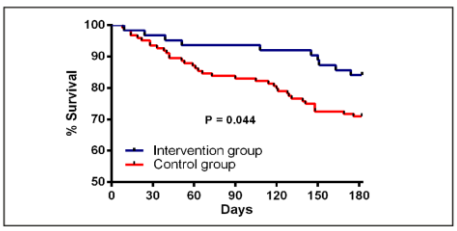
EFFECT OF A MINIMAL-MASSIVE INTERVENTION IN HOSPITALIZED OLDER PATIENTS WITH OROPHARYNGEAL DYSPHAGIA: A PROOF OF CONCEPT STUDY

A. MARTÍN[1], O. ORTEGA[1,2], M. ROCA[3], M. ARÚS[3], P. CLAVÉ[1,2,4]

Figure 3

Survival rate after 6 months follow up between control and intervention (MMI) groups (2 controls per case)



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Accepted: 12 October 2017
DOI: 10.1111/ger.12309

ORIGINAL ARTICLE

WILEY Geriatrology

An oral hygiene protocol improves oral health for patients in inpatient stroke rehabilitation

Joanne Murray | Ingrid Scholten

Speech Pathology, College of Nursing and Health Sciences, Flinders University, Adelaide, SA, Australia

The objective: To determine whether a simple oral hygiene protocol improves the oral health of inpatients in stroke rehabilitation.

- Oral Health Assessment Tool (OHAT)
  - 100 patients with and without dysphagia inpatient stroke rehabilitation facilities
  - Simple nurse-led oral hygiene regime was implemented with all participants
    - Twice daily tooth brushing
    - Mouth rinsing after lunch
  - OHAT repeated one week later.

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Accepted: 12 October 2017
DOI: 10.1111/ger.12309

ORIGINAL ARTICLE

WILEY Gerodontology

An oral hygiene protocol improves oral health for patients in inpatient stroke rehabilitation

Joanne Murray | Ingrid Scholten

Speech Pathology, College of Nursing and Health Sciences, Flinders University, Adelaide, SA, Australia

The objective: To determine whether a simple oral hygiene protocol improves the oral health of inpatients in stroke rehabilitation.

	n	OHAT score Day 0 Median (Range)	OHAT score Day 7 Median (Range)	*P* value across time
Patients with dysphagia	12	4 (0-10)	3 (1-6)	.024*
Patients without dysphagia	77	2 (0-8)	2 (0-9)	.282
P value between groups		.027*	.023*	

*Significant at $P < .05$.

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Pilot Testing of Intervention Protocols to Prevent Pneumonia in Nursing Home Residents

Vincent Quagliarello, MD, Manisha Juthani-Mehta, MD, Sandra Ginter, RN, Virginia Towle, M Phil, Heather Allore, PhD, and Mary Tinetti, MD

OBJECTIVES: To test intervention protocols for feasibility, staff adherence, and effectiveness in reducing pneumonia risk factors (impaired oral hygiene, swallowing difficulty) in nursing home residents.
DESIGN: Prospective study.
SETTING: Two nursing homes.
PARTICIPANTS: Fifty-two nursing home residents.
INTERVENTION: Thirty residents with impaired oral

to reduce pneumonia in nursing home residents. J Am Geriatr Soc 57:1226–1231, 2009.

Key words: pneumonia; nursing home; prevention

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South African Journal of Communication Disorders
ISSN: (Online) 2225-4765, (Print) 0379-8046

AOSIS

Page 1 of 11 Original Research

Implementing oral care to reduce aspiration pneumonia amongst patients with dysphagia in a South African setting

Authors:
Jashika Seedat[1]
Claire Penn[1]

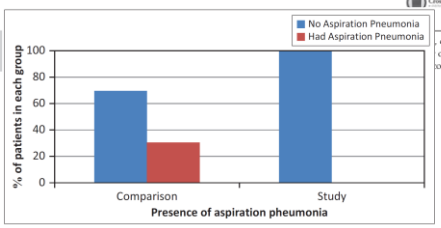

FIGURE 4: Presence of aspiration pneumonia within the study and comparison group.

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Oral Care Clinical Trial to Reduce Non–Intensive Care Unit, Hospital-Acquired Pneumonia: Lessons for Future Research

Edel McNally • Gintas P. Krisciunas • Susan E. Langmore • Janet T. Crimlisk • Jessica M. Pisegna • Joseph Massaro

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Table 3.

Oral Care Clinical Trial to Reduce Non-Intensive Care Unit, Hospital-Acquired Pneumonia: Lessons for Future Research

McNally, Edel; Kriscunas, Gintas P.; Langmore, Susan E.; Crimlisk, Janet T.; Pisegna, Jessica M.; Massaro, Joseph

The Journal for Healthcare Quality (JHQ)41(1):1-9, January/February 2019.

doi: 10.1097/JHQ.0000000000000131

	Analysis of maximum likelihood estimates				
Parameter (outcome)	**OR**	**95% confidence interval**		**Wald chi-square**	***p***
HAP rate in experimental vs. control groups	1.415	0.799	2.534	1.3597	.24
Parameter (covariates)	**OR**	**95% confidence interval**		**Wald chi-square**	***p***
Age	1.026	1.007	1.046	6.9686	.008
Sex	0.580	0.320	1.050	3.2331	.07
Stroke	1.873	0.996	3.909	3.7922	.05
Hereditary and degenerative diseases of CNS	0.623	0.147	2.648	0.4110	.52
Dementia	<0.001	<0.001	>999.999	0.0001	.99
COPD	1.474	0.746	2.910	1.2472	.26
Head and neck cancer	1.193	0.156	9.108	0.0277	.86
CHF	0.000	0.418	2.071	0.0312	.85
GERD	0.930	0.411	2.059	0.0411	.83
ETOH	<0.001	<0.001	>999.999	0.0004	.98
Dysphagia	1.158	0.527	2.547	0.1338	.71
No. of meds	1.016	0.956	1.081	0.2691	.60
Current smoker	1.072	0.440	2.611	0.0237	.87

CHF = congestive heart failure; CNS = central nervous system; COPD = chronic obstructive pulmonary disease; ETOH = alcohol-related; GERD = gastrointestinal reflux disease; HAP = hospital-acquired pneumonia; OR = odds ratio.

Multivariate Logistic Regression Analyses (Adjusted Analysis) Type 3 Analysis of Effects and ORs (and 95% Confidence Intervals) for All Covariates in the Model

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Table 1. Patient Demographics *n* (%) or Average (± *SD*)

	All patients (*n* = 2,890)	Experimental group (*n* = 1,403)	Control group (*n* = 1,487)
Age	59 (±17)	57 (±18.4)	60 (±16.1)
Sex			
Female	1,350 (46.7%)	690 (49.2%)	660 (44.4%)
Male	1,540 (53.3%)	713 (50.8%)	827 (55.6%)
Diagnosis			
COPD	521 (18.0%)	252 (18.0%)	269 (18.1%)
Dysphagia	393 (13.6%)	197 (14.0%)	196 (13.2%)
GERD	369 (12.8%)	178 (12.7%)	191 (12.8%)
CHF	326 (11.3%)	97 (6.9%)	229 (15.4%)
Stroke	322 (11.1%)	156 (11.1%)	166 (11.2%)
CNS disease	140 (4.8%)	69 (4.9%)	71 (4.8%)
ETOH	49 (1.7%)	28 (2.0%)	21 (1.4%)
HNC	36 (1.2%)	4 (0.3%)	32 (2.2%)
Dementia	8 (0.3%)	6 (0.4%)	2 (0.1%)
Length of stay (d)	5.1 (±4.8)	4.7 (±3.9)	5.4 (±5.5)
Dependence for feeding	932 (45.1%) (*n* = 2,068)	427 (44.4%) (*n* = 962)	505 (45.7%) (*n* = 1,106)
Toothbrushing per day	1.4 (0.8)	1.6 (0.9)	1.2 (0.7)

CHF = congestive heart failure; CNS = central nervous system; COPD = chronic obstructive pulmonary disease; ETOH = alcohol-related; GERD = gastrointestinal reflux disease; HNC = head and neck cancer.

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American Journal of Infection Control 000 (2021) 1–4

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journal homepage: www.ajicjournal.org

Brief report

Non-ventilator associated hospital acquired pneumonia incidence and health outcomes among U.S. veterans from 2016-2020

Evan Carey PhD [a,b,e], Richard Blankenhorn MSDA, BSF [c], Peter Chen MPH [c], Shannon Munro PhD, APRN, NP [d]

[a] Research and Development, Rocky Mountain Regional VA Medical Center, Aurora, CO
[b] VA Collaborative Evaluation Center, A collaboration of VA Medical Center in Aurora, CO, Seattle, WA, Cleveland, OH
[c] Research and Development, Rocky Mountain Regional VA Medical Center, Aurora, CO
[d] Research and Development, Salem VA Medical Center, Salem, VA

Key words:
Non-ventilator associated hospital acquired pneumonia

ABSTRACT

Among 1,635,711 Veteran acute care admissions (FY2016-2020), the risk of non-ventilator associated hospi-

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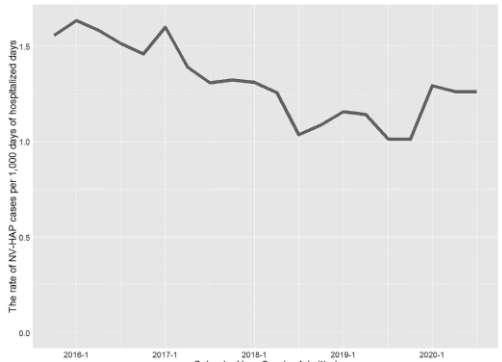

Fig 1. The rate NV-HAP cases per calendar year quarter between 2015Q4-2020Q2.

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FEATURE ARTICLE

Implementing Oral Care as a Nursing Intervention to Reduce Hospital-Acquired Pneumonia Across the United States Department of Veterans Affairs Healthcare System

Shannon Munro, PhD, APRN, FNP-C, Toni Phillips, DNP, RN-BC, Rachael Hasselbeck, MSN, MBA, RN, Michelle A. Lucatorto, DNP, FNP-C, Andrew Hehr, MSN, RN, Sheila Ochylski, DNP, RN-BC, CNIO

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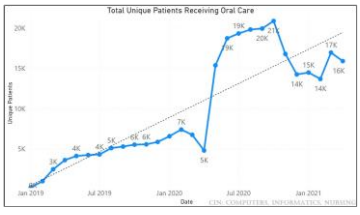
FIGURE 5



Implementing Oral Care as a Nursing Intervention to Reduce Hospital-Acquired Pneumonia Across the United States Department of Veterans Affairs Healthcare System

Munro, Shannon; Phillips, Toni; Hasselbeck, Rachael; Lucatorto, Michelle A.; Hehr, Andrew; Ochylski, Sheila

CIN: Computers, Informatics, Nursing4Q(1):35-43, January 2022.

doi: 10.1097/CIN.0000000000000808

VHA oral care assessments from January 2019 to April 2021. The decline in oral care assessments coincides with the peaks of the COVID-19 pandemic and subsequent decrease in census.

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Infection Control & Hospital Epidemiology (2021), 1–6
doi:10.1017/ice.2021.239

Commentary

Nonventilator hospital-acquired pneumonia: A call to action

Recommendations from the National Organization to Prevent Hospital-Acquired Pneumonia (NOHAP) among nonventilated patients

Shannon C. Munro PhD, APRN, NP-BC[1], Dian Baker PhD, APRN[2], Karen K. Giuliano PhD, MBA, RN[3],

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The Joint Commission.

Quick Safety

Issue 61 | September 2021

Preventing non-ventilator hospital-acquired pneumonia

Issue:

It's estimated that one in every 100 hospitalized patients will be affected by non-ventilator hospital-acquired pneumonia (NVHAP). While NVHAP is a significant patient safety and quality of care concern, it is not currently recognized as one of the National Database of Nursing Quality indicators for which hospitals are held accountable; nor is it one of the conditions that the Centers for Medicare & Medicaid Services (CMS) requires hospitals to report to the Centers for Disease Control & Prevention (CDC) National Healthcare Safety Network; and it is not integrated into the CMS current pay-for-reporting or performance programs.[1] As a result, this leaves NVHAP a health care-acquired condition without national tracking or accountability, and, most likely, is unaddressed by health care organizations.

A recent article in the journal *Infection Control & Hospital Epidemiology* (ICHE) detailed a call to action from national organizations, including The Joint Commission, to address NVHAP. The call to action includes launching a national health care conversation about NVHAP prevention and encouraging researchers to develop new strategies for NVHAP surveillance and prevention. This issue of *Quick Safety* focuses on the call's challenge to health care systems to implement and support NVHAP prevention, and to add NVHAP prevention measures to education for patients, health care professionals and students.[1]

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Barriers to oral care

- Low priority due to lack of time
- Perception that oral care is a comfort measure only
- Inadequate poorly designed oral care supplies
- Staff need education about oral care for complex patient
- Oral care documentation is not a part of the electronic health record
- Uncooperative patient
- Patient with dysphagia
- Other prevention measures not followed e.g. head of bed elevated, early and frequent ambulation

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- *Brady MC, Furlanetto DL, Hunter RV, Lewis SC, Milne V. Improving oral hygiene in patients after stroke. Stroke. 2007;38:1115–1116.*
  - Oral care is not prioritized by nursing staff.
- *Allen FL, Binkley CJ, McCurren C, Carrico R. Factors affecting quality of oral care in intensive care units. J Adv Nurs. 2004;48:454–462.*
  - Nursing staff generally view oral care to be unpleasant and a task that requires considerable time *and is often delegated* to a nursing assistant.

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Oral Care Problems

- *Kuramoto C, Watanabe Y, Tonogi M, Hirata S, Sugihara N, Ishii T et al. Factor analysis on oral health care for acute hospitalized patients in Japan. Geriatr Gerontol Int. 2011;11:460–466.*
  - Only 29% of 2444 responding hospitals in Japan provided OHC training to nurses
  - Only 33% of 70 responding stroke-specific units provided training in Scotland
- *Talbot A, Brady M, Furlanetto DL, Frenkel H, Williams BO. Oral care and stroke units. Gerodontology. 2005;22:77–83.*
  - Just 15 of 70 stroke units used an OHC protocol
  - only 3/15 providing evidence-based care

111

Who Should Do It?

- Kenneth Shay, DDS, MS. (2007) Who Is Responsible for a Nursing Home Resident's Daily Oral Care?. *Journal of the American Geriatrics Society* :9, 1470–1471
  - Costs are also high for:
    - Bathing
    - Toileting
    - Feeding

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Chae, J. M., Song, H., Kang, G., & Lee, J. Y. (2015). Impact of Nurse Staffing Level and Oral Care on Hospital Acquired Pneumonia in Long-term Care Hospitals. *Journal of Korean Academy of Nursing Administration*, *21*(2), 174-183.

Variables	Categories	OR	95% CI	*p*
Patient characteristics	Age	1.02	1.01~1.04	<.001
	Gender Male (vs. Female)	2.18	1.82~2.62	<.001
	Bedfast status Yes (vs. No)	1.40	1.09~1.78	.007
	Swallowing difficulty Yes (vs. No)	1.10	0.83~1.47	.502
	ADL	1.12	1.09~1.15	<.001
	Length of stay	0.10	0.99~0.99	<.001
Hospital general characteristics	Number of beds less than 100 (vs. 100~199) 200 or more (vs. 100~199)	1.35 1.37	0.98~1.85 1.05~1.80	.922 .023
	Percent of the highest severity patients	1.06	1.04~1.09	<.001
Staffing level of hospital	Patients per MD	1.04	1.01~1.08	.008
	Patients per Nursing staff	1.43	1.22~1.68	<.001
	Skill mix (percent of registered nurses)	0.97	0.85~1.11	.668
Oral care in the hospital	No (vs. Yes)	1.29	1.01~1.64	.041

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Oral Care Training

for Nurses and Nursing Assistants

Enter the name of your facility/medical center here
Enter date here

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Oral Care Training for Nurses and Nursing Assistants

Prevent pneumonia, help your patients brush

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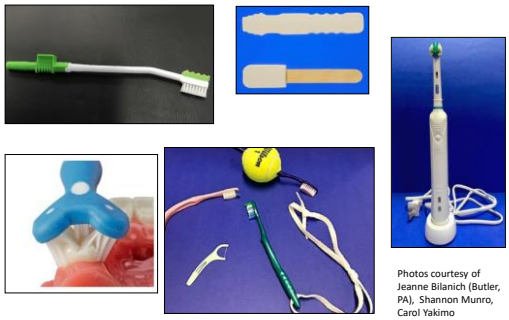
Oral care supplies



Photos courtesy of Jeanne Bilanich (Butler, PA), Shannon Munro, Carol Yakimo

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Oral care swabs, toothettes, and mouthwash

- These products by themselves do not adequately remove plaque and biofilm.
- Mechanical removal with simple toothbrushing- with or without toothpaste is recommended.
- Disposable oral care swabs and toothettes are designed for *single use* with edentulous patients or for application of mouth moisturizer.
  - Choking hazard if sponge is dislodged

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Chlorhexidine

- The evidence that oral application of Chlorhexidine (CHG) is safe and effective among non-ventilated patients is less robust that it seems:
  - *Indiscriminate CHG use for nonventilated patients may in fact increase mortality risk among those at lowest risk of death* (due to aspiration of CHG or anaphylaxis) (OR 2.92, 95% CI 2.62-3.26) (JAMA, 2014, 174; BMJ 2014, 348; Int Care Med Exp 2017, 5(2); Int Care Med 2018, 44).
  - *CHG may increase antibiotic resistance* (Curr Opin Crit Care 2018, 24; J Hosp Infect 2016, 94; Intensive Care Med 2018, 44).
  - *Allergic reactions including anaphylaxis has been reported with CHG* (Postgrad Med 2014, 90; Allergy 2014, 69; Allergy Clin Immunol 2007, 120).

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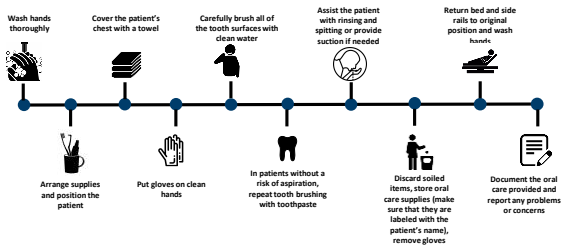
Assisting a Patient with Oral Care



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Set up oral hygiene supplies

For patients with natural teeth:

- Gloves
- Soft toothbrush
- Fluoride Toothpaste
- Clean tap water
- Clean Towels
- Cup and basin
- Alcohol free mouthwash (optional)
- Petroleum free lip balm (optional)
- Suction toothbrush, canister, tubing, and sterile water as needed
- All supplies should be labeled with the patient's name

120

While you are setting up supplies, greet the patient and ask permission to assist. If the patient can't get out of bed, **elevate the head of the bed.**

121

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Remember: Wash your hands!

122

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How much toothpaste?

Brushing teeth with water alone helps remove the sticky film of germs. When using toothpaste, keep in mind that very little is needed.

This is TOO much toothpaste!

You should use a pea sized amount of toothpaste. For patients at risk for aspiration, brush the teeth with clean tap water alone.

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123

What if the patient can't hold their mouth open for tooth-brushing?

You may use a bite block or place a clean moist rolled up washcloth between the back teeth to help the patient hold their mouth open.

124

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What if the patient won't open his/her mouth?

- If the patient clenches, don't force
- If possible, brush the outside surfaces of the teeth
- Brushing some of the teeth is better than brushing none

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125

What if the gums bleed?

Bleeding gums is a sign of gum disease. With continued, twice-daily tooth-brushing, the gums should stop bleeding.

126

126

After brushing:

Help the patient swish with water and spit into a cup or basin. Use a suction toothbrush as needed.

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Clean dentures and partials daily

- Wash hands and put on gloves.
- Place dentures/partials in a 9x12 clear plastic bag. Pour denture cleaner in the bag until the dentures are covered with solution. (You may also use denture cleaning tablets- follow directions on label.)
- Zip the bag shut and gently shake the bag to ensure all of the denture surfaces are clean. Place the filled bag in the sink and soak for approximately 2 minutes. After soaking, remove the dentures from the bag.
- Pour the used denture cleaning solution in the sink and discard the plastic bag in the trash.
- Under warm running water, gently brush all surfaces of the denture/partials using a denture brush or soft toothbrush. Rinse the brush thoroughly after use. Return dentures/partials to the patient.
- Remove gloves and wash your hands. Don't forget to remove the patient's dentures at night to give the mouth a rest.

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Using a suction toothbrush

- Read and follow the manufacturer's instructions.
  - Before opening, turn package over, burst solution packet with thumbs. Open package and remove toothbrush and attach to suction.
  - Brush teeth **approximately 1 minute.** To suction, place thumb over port. To clear tubing, rinse with sterile saline. Discard after use.

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When you are finished with oral care

- Clean up and store supplies
- Rinse toothbrush/denture brush well and place in the driest, cleanest place in the room
- Remember to label the patient's oral care supplies if not already labeled
- Allow toothbrush/denture brush to air dry
- Remove gloves and wash hands
- Document the oral care provided

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Report the following to the team:

- Pain, sores, blisters, ulcers
- Swellings, growths, or lumps
- Red or white areas
- Broken or cracked dentures
- Broken or decayed teeth
- Dry mouth

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Remember:

- Approach the patient at eye level and maintain eye contact
- Smile, praise, and encourage
- Give breaks often
- Use a gentle touch
- **Have the patient hold the toothbrush and assist with your hand over theirs. This may help them remember how to brush.**
- Patient refuses? Don't force it. Try again later when he feels better.
- Ensure the patient's oral care supplies are properly labeled and store them in the driest, cleanest place in the room.

Training adapted with permission from the University of Kentucky College of Dentistry. Photographs provided by Dr. Robert Henry at the University of Kentucky College of Dentistry and Dr. Owais Farooqi at the Salem VAMC with written patient consent. Please refer to the standard operating procedure.

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Oral Hygiene Training

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Oral Care Toolkit_3_7_18.docx - Google Drive
docs.google.com

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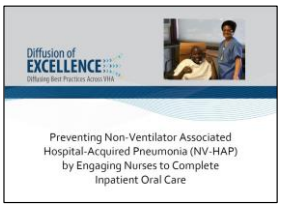
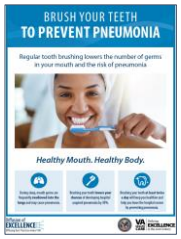
VA National Oral Care Implementation Toolkit





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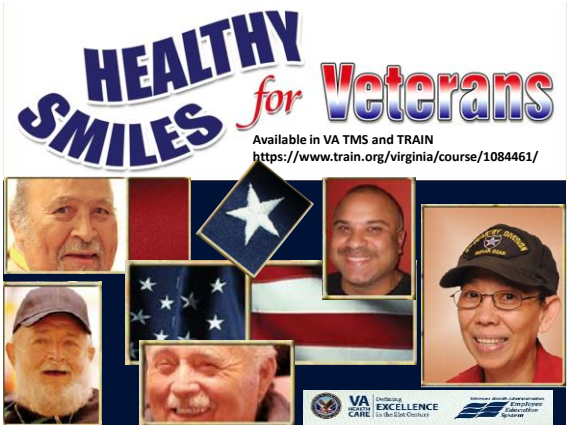

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Ways to engage and train staff to provide oral care

- SLP serve as a consultant/ educator for patients at high risk for aspiration. They may also provide education for staff.
- Oral Health Champion
  - Liaison between nursing and dental staff
- Train-the-Trainer model
- Include information in new employee orientation
- Annual in-service training and competency tracking
- Simulation lab

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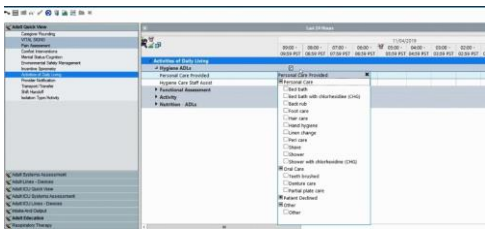
Electronic medical record



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- We predict the VA will save over $200M annually with national deployment
- Oral care (2-3 times daily) reduces the risk of NV-HAP by 40-60% which:
  - Shortens hospital stays (excess LOS NV-HAP in Vets 10-14 days)
  - Reduces cost ($40,000 per patient) and saves lives (18-38% mortality)

Asheville and Durham VAMC HAPPEN Teams

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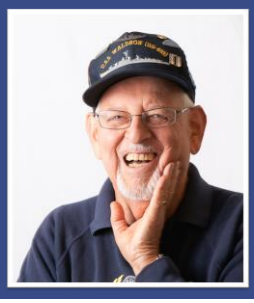
We cannot do this alone, we need you



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