Mitigating the Risk of HAP with Oral Hygiene

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Speaker Disclosures

- Speaker is on the Stryker speakers bureau.
- This educational event is supported by Stryker.
- Content and slides were developed by the speaker and meet criteria of being evidence-based, fair and balanced.

Objectives

- Discuss definitions related to Hospital-Acquired Pneumonia (VAP and NV-HAP)
- Understand risk factors for HAP
- Identify importance of oral care for mitigating risk factors of HAP

Ventilator-Associated Pneumonia

- VAP is the most frequent infection occurring in patients after admission to the intensive care unit (ICU)[1].
- In a large European observational study, almost 25% of patients developed an ICU-acquired infection, and the respiratory site accounted for 80% of these infections[2].
- VAP can be linked with increased duration of ventilation, ICU and hospital length of stay, and significantly increased costs[2].
- Prevention of VAP is possibly one of the most cost-effective interventions currently attainable in the ICU[3].

[1] Vincent J-L et al. Sepsis in European intensive care units: Results of the SOAP study. Critical Care Medicine 2006, 34:344-353.
[2] Safdar N et al. Clinical and economic consequences of ventilator-associated pneumonia: a systematic review. Critical Care Medicine 2005, 33:2184-93.
[3] Shorr AF & Wunderink RG. Dollars and sense in the intensive care unit: the costs of ventilator associated pneumonia. Critical Care Medicine 2003, 31:1582-3.

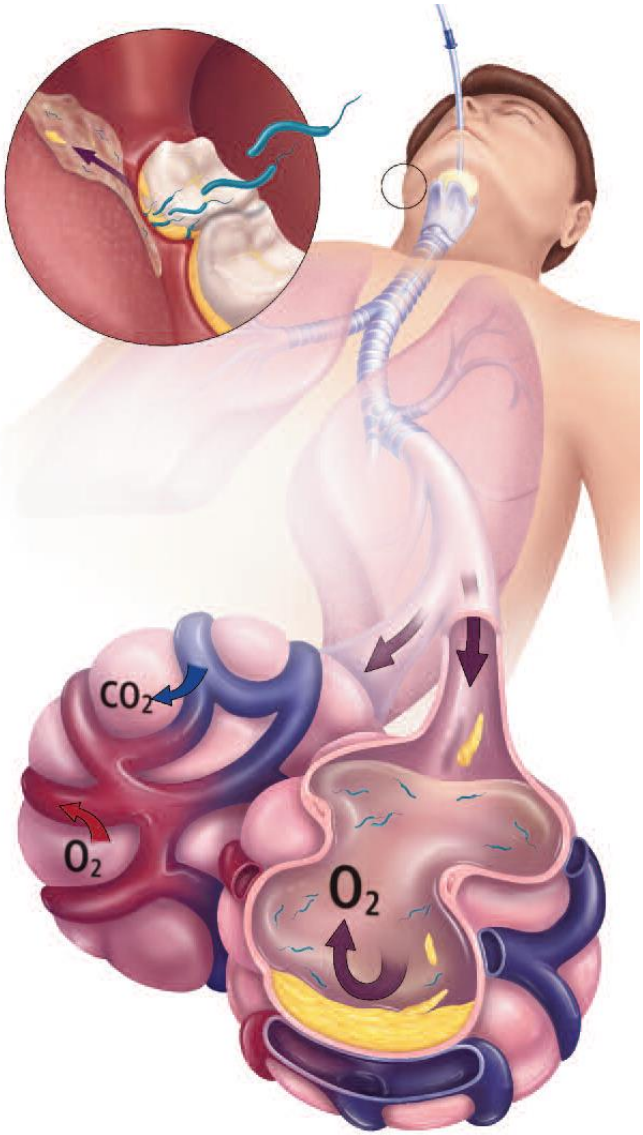
Financial Impact of Hospital-Acquired Infections

Infection	Cost per Incident
VAPs	$39,828 per VAP[1]
HAPs	$28,008 per HAP[2]
CAUTIs	$3,803-$4,687 per CAUTI[3,4]
Sacral Pressure Ulcers	$1,606 - $71,503 per sPU[5,6]
Heel Pressure Ulcers	$1,606 - $71,503 per hPU[5,6]
SSIs	$25,546 per SSI[7]

1. Kollef M, Hamilton C, Ernst F, Economic Impact of Ventilator-Associated Pneumonia in a Large Matched Cohort. Infection Control and Hospital Epidemiology. March 2012; 33(3):250-256
2. Davis J., The Breadth of Hospital-Acquired Pneumonia: Nonventilated versus Ventilated Patients in Pennsylvania, Pennsylvania Patient Safety Advisory 2012; 9(3):99-105
3. Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs), APIC, 2008; 5, 40.
4. Chen Y, Chou Y, Chou P. Impact of nosocomial infection on cost of illness and length of stay in intensive care units. Infection Control and Hospital Epidemiology. 26(3):283.
5. Russo, AC, at al., Hospitalizations Related to Pressure Ulcers Among Adults 18 Years and Older, 2006, Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality Statistical Brief #64, Dec. 2008
6.Padula WV, et al. Improving the quality of pressure ulcer care with prevention: a cost-effective analysis. Med Care, April 2011; 49(4):385-92
7.Stone PW, et al., Am J Infect Control. Nov 2005;33(9):501-9.

HAPs & VAPs

- Hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP), & aspiration pneumonia often start in the oral cavity.[1,2] Bacteria can colonize in the oropharyngeal area[3] & can be aspirated into the lungs, causing infection.[4]
- VAP development is associated with high rates of morbidity and mortality, and is fatal for 20% - 41% of patients.[5]
- VAP is caused by a number of factors & can lead to prolongation of mechanical ventilation, ICU stay, hospital stay, & associated increases in costs.[2]
- 21.8% of all HAIs are pneumonias.[6] 61% of pneumonias are acquired by non-ventilated patients (NV-HAP).[6]



1. Schleder B, et al., J Advocate Health Care. 2002 Spr/Sum; 4(1); 27-30. **2.** Tablan OC, et al., Guidelines for preventing health-care associated pneumonia, 2003, Recommendations of CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC), 2003. **3.** Scannapieco FA, J Periodontology. 1999 Jul; 70(7):793-802. **4.** Fourrier F, at al., Crit Care Med. 1998;26: 301-8. **5.** AACN Practice Alert: Ventilator-Associated Pneumonia. Critical Care Nurse 2008;83-85. **6.** Magill SS., Multistate point prevalence survey of health-care associated infectios, N Engl J Med 2014; 370:1198-208.

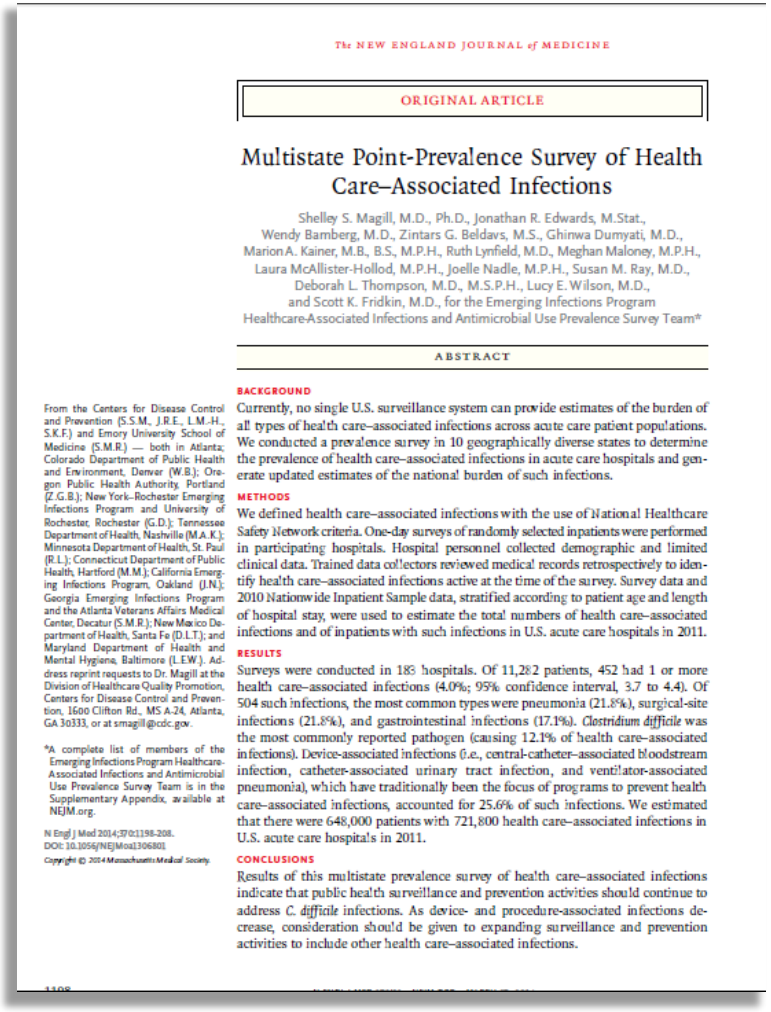
Hospital-acquired pneumonia rates in UK

- England 26%
- Northern Ireland 28%
- Scotland 20%
- Wales 18%

European Centre for Disease Prevention and Control. Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals. Stockholm: ECDC; 2013.

Multistate Point-Prevalence Survey of Health Care-Associated Infections - NEJM

- 183 hospitals
- 11,282 patients
- 22% of HAIs are pneumonia
- 61% of hospital acquired pneumonias are non-vent patients*



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Multistate Point-Prevalence Survey of Health Care–Associated Infections

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N Engl J Med 2014;370:1198-208.
DOI: 10.1056/NEJMoa1306801

ABSTRACT

BACKGROUND

Currently, no single U.S. surveillance system can provide estimates of the burden of all types of health care–associated infections across acute care patient populations. We conducted a prevalence survey in 10 geographically diverse states to determine the prevalence of health care–associated infections in acute care hospitals and generate updated estimates of the national burden of such infections.

METHODS

We defined health care–associated infections with the use of National Healthcare Safety Network criteria. One-day surveys of randomly selected inpatients were performed in participating hospitals. Hospital personnel collected demographic and limited clinical data. Trained data collectors reviewed medical records retrospectively to identify health care–associated infections active at the time of the survey. Survey data and 2010 Nationwide Inpatient Sample data, stratified according to patient age and length of hospital stay, were used to estimate the total numbers of health care–associated infections and of inpatients with such infections in U.S. acute care hospitals in 2011.

RESULTS

Surveys were conducted in 183 hospitals. Of 11,282 patients, 452 had 1 or more health care–associated infections (4.0%; 95% confidence interval, 3.7 to 4.4). Of 504 such infections, the most common types were pneumonia (21.8%), surgical-site infections (21.8%), and gastrointestinal infections (17.1%). *Clostridium difficile* was the most commonly reported pathogen (causing 12.1% of health care–associated infections). Device-associated infections (i.e., central-catheter–associated bloodstream infection, catheter-associated urinary tract infection, and ventilator-associated pneumonia), which have traditionally been the focus of programs to prevent health care–associated infections, accounted for 25.6% of such infections. We estimated that there were 648,000 patients with 721,800 health care–associated infections in U.S. acute care hospitals in 2011.

CONCLUSIONS

Results of this multistate prevalence survey of health care–associated infections indicate that public health surveillance and prevention activities should continue to address *C. difficile* infections. As device- and procedure-associated infections decrease, consideration should be given to expanding surveillance and prevention activities to include other health care–associated infections.

* Magill, S. et al. *Multistate Point-Prevalence Survey of Health Care-Associated Infections*. The New England Journal of Medicine. March 2014; 370:1198-208. DOI 10.1056/NEJMoa1306801. Table 2 citation 2 shows 39.1% of pneumonia events associated with mechanical ventilator.

High Mortality, Longer Stays, Increased Costs

	HAP	VAP
Mortality	18.7%[1]	20 - 41%[2]
Length of Stay	15.2 days[3]	23 days[3]
Hospital Costs	$28,008[1]	$39,828[4]

- 9.6 more days on vent[5]
- 6.1 more days in ICU[5]
- 11.5 more days in hospital[5]
- > $40,000 per case to treat (Facility pays the bill)[4]

1. Davis J. The Breadth of Hospital-Acquired Pneumonia: Nonventilated versus Ventilated Patients in Pennsylvania, Pennsylvania Patient Safety Advisory 2012; 9(3):99-105 **2.** AACN Practice Alert: Ventilator-Associated Pneumonia. Critical Care Nurse 2008 83-85. **3.** Kollef MH, et al., Chest. Dec 2005;128(6):3854-62. **4.** Kollef M, Hamilton C, Ernst F, Economic Impact of Ventilator-Associated Pneumonia in a Large Matched Cohort. Infection Control and Hospital Epidemiology. March 2012; 33(3):250-256. **5.** Rello J. et al., Chest. Dec 2002; 122(6): 2115-21.

3 Year Retrospective Study of NVHAP in Pennsylvania

The Breadth of Hospital-Acquired Pneumonia:
Nonventilated versus Ventilated Patients in Pennsylvania
Pennsylvania Patient Safety Advisory - 2013 Sep

Table 1. Pennsylvania Nosocomial Pneumonia and Related Deaths

YEAR	NO. OF NV-HAP	NO. OF NV-HAP	% OF NV-HAP CASES CONTRIBUTING TO DEATH	NO. OF VAP	NO. OF VAP	% OF VAP CASES CONTRIBUTING TO DEATH
2009	1,976	363	18.4 (95% CI: 16.5 to 20.3)	922	163	17.7 (95% CI: 15.0 to 20.5)
2010	1,848	366	19.8 (95% CI: 17.8 to 21.8)	737	144	19.5 (95% CI: 16.3 to 22.7)
2011	1,773	315	17.8 (95% CI: 15.8 to 19.7)	640	127	19.8 (95% CI: 16.4 to 23.3)
Total	**5,597**	**1,044**	**18.7 (95% CI: 17.5 to 19.8)**	**2,299**	**434**	**18.9 (95% CI: 17.1 to 20.7)**

Note: NV-HAP refers to nonventilator-hospital-acquired pneumonia and VAP refers to ventilator-associated pneumonia.

Table 2. Estimated Costs of NV-HAP and VAP Cases

YEAR	NO. OF NV-HAP	COST FOR NV-HAP CASES	NO. OF VAP	COST FOR VAP CASES
2009	1,976	$55,343,808	922	$34,521,524
2010	1,848	$51,758,784	737	$27,594,754
2011	1,773	$49,658,184	640	$23,962,880
Total	**5,597**	**$156,760,776**	**2,299**	**$86,079,158**

Note: The estimated average cost per NV-HAP case is $28,008. The estimated average cost per VAP case is $37,442. Average costs derived from the following study: Kalsekar I, Amsden J, Kothari S, et al. Economic and utilization burden of hospital-acquired pneumonia (HAP): a systematic review and meta-analysis. *Chest* 2010 Oct;138(4_MeetingAbstracts):739A.

tion strategies:
ccines and immunizations.
ng cessation counseling.
onmental infection control

sonal hygiene, including hand

atient's risk for aspiration.
ntia screening.
ient's nutritional status.
tine professional dental care.

prevent colonization:
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e capacity.
tance to atelectasis.
ce to infection.

– Institute a routine oral hygeine regimen.
– Eliminate oral bacteria reservoirs.
– Consult with a dental professional.
– Protect oral epithelial cells and nasal passages by providing moisture and avoiding large-bore nasogastric tubes.
– Avoid unnecessary antibiotics.
– Avoid unnecessary stress ulcer prophylaxis (if necessary, consider a cytoprotective agent).
– Consider chlorhexidine oral rinse or chlorhexidine bath for select patient populations.

Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2002 Aug;94(2):191-5. Institute for Healthcare Improvement (IHI). Prevent ventilator-associated pneumonia [website]. [cited 2012 Mar 30]. Cambridge (MA): IHI. http://www.ihi.org/explore/VAP/Pages/default.aspx. Scannapieco FA, Bush RB, Paju S. Associations between periodontal disease and risk for nosocomial bacterial pneumonia and chronic obstructive pulmonary disease. A systematic review. Ann Periodontol 2003 Dec;8(1):54-69. Scannapieco FA, Papandonatos GD, Dunford RG. Associations between oral conditions and respiratory disease in a national sample survey population. Ann Periodontol 1998 Jul;3(1):251-6. Successful reduction of ventilator-associated pneumonia. Pa Patient Saf Advis [online] 2009 Jun [cited 2012 Mar 30]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2009/Jun6(2)/Pages/63.aspx. Tablan OC, Anderson LJ, Besser R, et al. Guidelines for preventing health-care-associated pneumonia, 2003. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee [online]. 2003 [cited 2012 Mar 30]. http://www.cdc.gov/hicpac/pdf/guidelines/HApneu2003guidelines.pdf.

Davis, James, BSN, RN, CCRN, CIC. *The Breadth of Hospital-Acquired Pneumonia: Nonventilated versus Ventilated Patients in Pennsylvania*. PA Patient Safety Advisory 2012 Sep;9(3):99-105

Risk Factors

Risk Factors HAP (VAP and NV-HAP)

- Host related
  - Highest rate in Neurosurgical, Trauma and Burn Patients
  - Age > 65 years
  - Underlying illness including COPD, immunosuppression, depressed LOC and thoracic and abdominal surgery
  - Impaired Mobility
- Device related
  - Endotracheal tubes, mechanical ventilation, NG placement and enteral feedings
  - Lack of anatomic barriers, impaired cough, alteration of mucus and mucocilliary clearance
  - Reintubation

Risk Factors

- Personnel and procedural related factors
  - Cross contamination by staff (ineffective handwashing)[1]
  - Broad-spectrum antibiotics, use of antacids, steroids and paralytics[1]
  - Supine positioning, HOB not elevated 30 degrees[1,2]
  - Administration of saline during suctioning[1]
  - Blood transfusions[3]
  - Transport out of ICU[4, 5]
  - Oropharyngeal colonization[2,4]
    - poor oral care

[1] The Occurrence of Ventilator-Associated Pneumonia in a Community Hospital: Risk Factors and Clinical Outcomes. Ibrahim et al CHEST Aug 2001 120(2): 555-561.

[2] Evidence-Based Clinical Practice Guideline for the Prevention of Ventilator-Associated Pneumonia. Dodek et al Annuals of Int Med Aug 2004 ;141(4):305-313

[3] Bochicchio, GV, Napolitano, L, et al. Blood product transfusion and ventilator-associated pneumonia in trauma patients. Surg Infect (Larchmt) 2008 Aug;9(4):415-22.

[4]Oliveira, J. et alPrevention of ventilator-associated pneumonia. Revista Portuguesa de Pnuemologia (English Edition), 2014; 20(3): 152-161

[5] Bercault, N, et al. Intrahospitaltransport of critically ill ventilated patients: a risk factor forventilator-associated pneumonia --- a matched cohort study. CritCare Med. 2005;33:2471---8.41.

Risk Factors for VAP

- Retrospective case control
- Medical, surgical and neuroscience units
- N=110 patients
- Mandatory modes of ventilation and positive fluid balance are risk factors for VACs.
- Benzodiazepines, opioids and paralytic agents are risk factors for IVAC.

Risk Factors for Ventilator-Associated Events: A Case-Control Multivariable Analysis. Lewis, S et al. Aug, 2014 CCM; 42(8):1839-1848.

Modifiable risk factors for pneumonia in community-dwelling older adults

- To identify modifiable risk factors, focusing on oral hygiene, for pneumonia requiring hospitalization of community-dwelling older adults.
- Prospective observational cohort study of 3,075 well-functioning community-dwelling adults aged 70 to 79 enrolled in the Health, Aging, and Body Composition Study
- 1,441 had complete data, a dental exam within 6 months of baseline
- Primary outcome was pneumonia requiring hospitalization through 2008.
- Of 1,441 participants, 193 were hospitalized for pneumonia.
- Mobility limitation and higher mean oral plaque score were two modifiable risk factors that 22% of pneumonia requiring hospitalization could be attributed. Data suggest innovative opportunities for pneumonia prevention among community-dwelling older adults.

Juthani-Mehta M et al. J Am Geri Soc.; 61(7):1111-8, 2013

Prevention Strategies

- Nonspecific measures include standard preventative measures, such as hand hygiene and proper use of gloves.
- Specific preventive measures are tailored to patients with risk factors for VAP/HAP.
- Three objectives for prevention:
  - 1) Reduce the exposure time from MV
  - 2) Minimize the frequency of aspirations
  - 3) Decrease bacterial colonization of the oropharynx.

Hand Washing

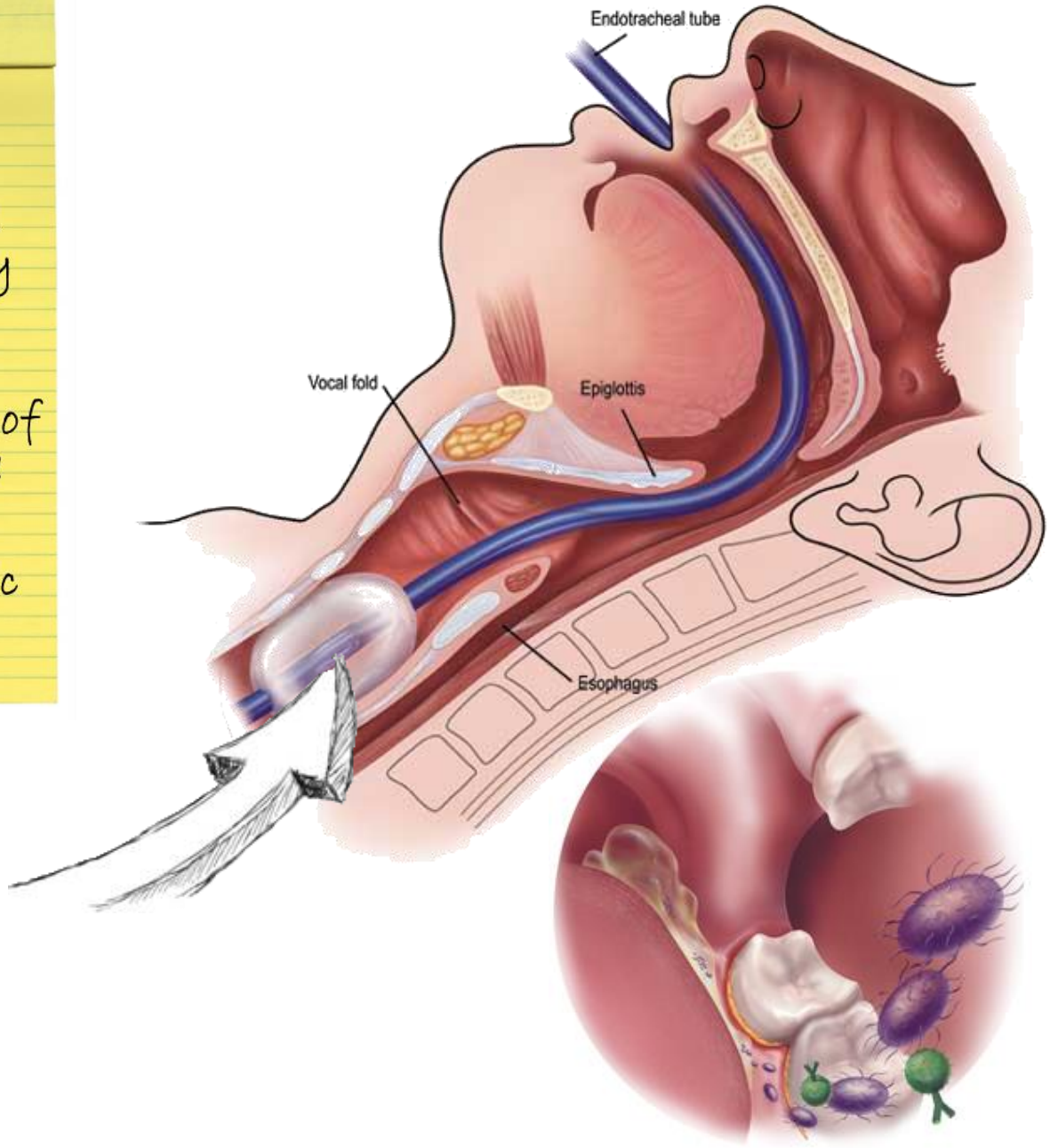
- Stringent hand washing is the most effective way of removing pathogens and preventing infection

Three Key Risk Factors for VAP

RISK FACTORS

1. Colonization of dental plaque with respiratory pathogens
2. Bacterial colonization of the oropharyngeal area
3. Aspiration of subglottic secretions.

NOTE: Routine suctioning minimizes oral secretions that can migrate to the subglottic area



Rello J, et al., Chest. 2002 Dec; 122 (6):2115-21.

Oral Care

- **Most VAP is associated with the aspiration of bacteria from the oropharynx and GI tract**

- Bacteria invade the lower respiratory tract by micro- or bolus aspiration of oropharyngeal organisms

CDC, 1997; Kollef, 2002
Koeman, van der Ven, Ramsay, Hoepelman, and Bonten, 2001

Don’t let your patient’s mouth look like this

Oropharyngeal colonization

- N=89
- Examined microbial colonization of oropharynx during ICU stay
- Compared chromosomal DNA

Results

- Diagnosed 31 VAP cases
- 28 of 31 with VAP – the causative organism was identical DNA sample

Garrcuate, et al. Am J Respir Crit Care Med; 1997; 156: 1647-1655

Plaque

- Dental plaque serves as a bacterial reservoir and plaque colonization a specific source of gram-negative nosocomial infection

- Study comparing plaque colonization in ICU patients to healthy dental clinic patients
  - 65% of the plaque in the medical ICU patients colonized by respiratory pathogens compared to only 16% in dental clinic patients

Fourrier 1998, Scannapieco 1992

Pathogenesis

Germs in Mouth
- Dental plaque provides microhabitat
- Replicates 5x/24 hrs

Aspirated
- Most common route
- 45% healthy adults micro-aspirate in sleep

Weakened Host
- Poor cough
- Immunosuppressed
- Multiple co-morbidities

HAP

Quinn B, et al.: Basic Nursing Care to Prevent Nonventilator Hospital-Acquired Pneumonia. Journal of Nursing Scholarship, 2014. 46(1): 11-19.

Risk Factors for Oral Bacteria in the Hospital Setting

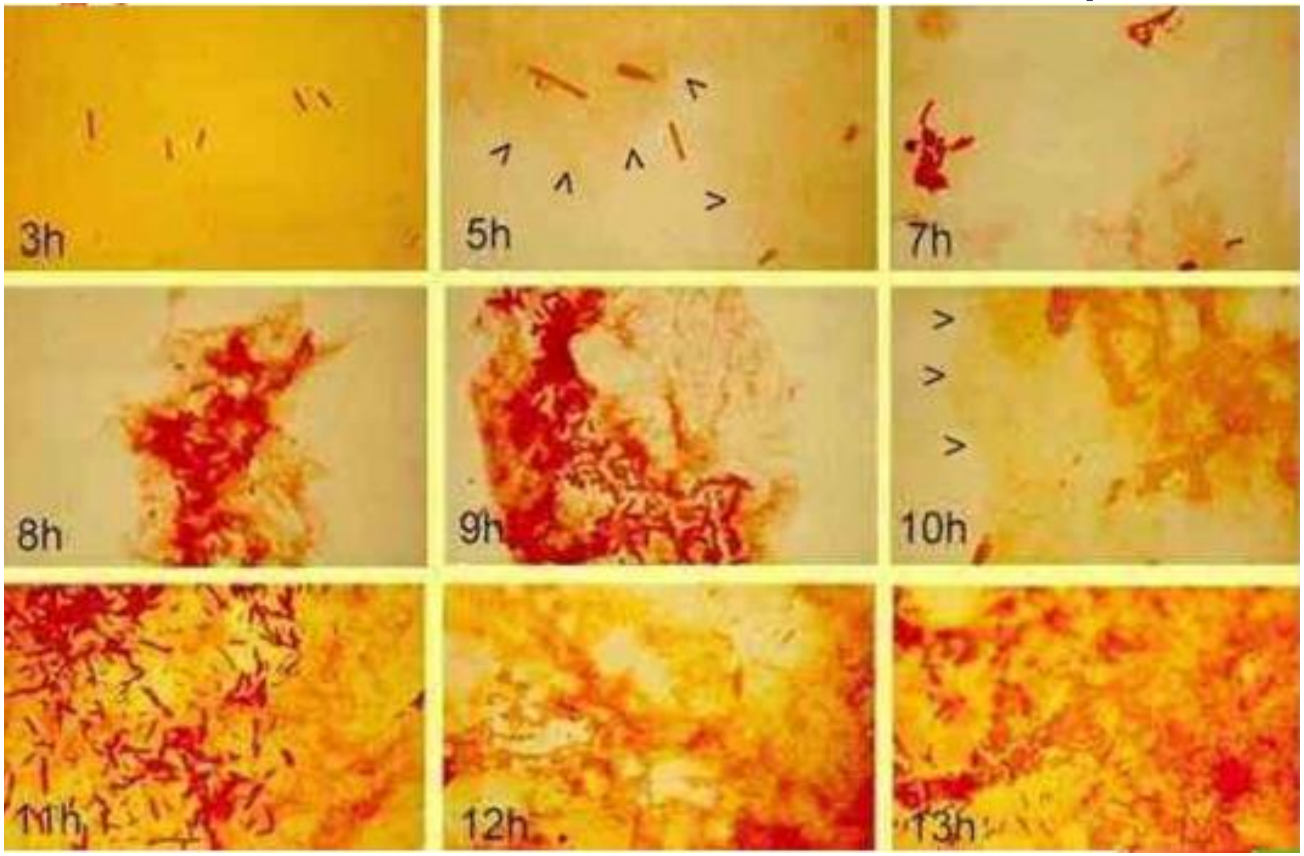


Image retrieved from:helios.bto.ed.ac.uk/bto/microbes/biofilm.htm

Scannapieco, Et al. Colonization of dental plaque by respiratory pathogens in medical intensive care patients. *Crit care med*. 1992; 20:740-745

Ventilator Associated Pneumonia (VAP)—Improving Practice With An Audited Oral Care Intervention, Medway, NHS Foundation Trust, Gray K, Jarvis S, Bomford J, Hayden P, Divekar N, Medway Maritime Hospital, NHS Foundation Trust, Intensive Care Unit (ICU), Gillingham, Kent, UK.

Prevention

Germs in Mouth

- Provide comprehensive oral care for all patients: the right equipment, protocols, education.

Aspiration

- Use aspiration prevention strategies.
- Recognize micro-aspiration risks and need for clean mouth.

Weak Host

- Strengthen host defenses, promote early mobility, and encourage deep breathing.
- Regulate glucose level, provide adequate nutrition, monitor use of histamine-2 blockers and proton pump inhibitors.

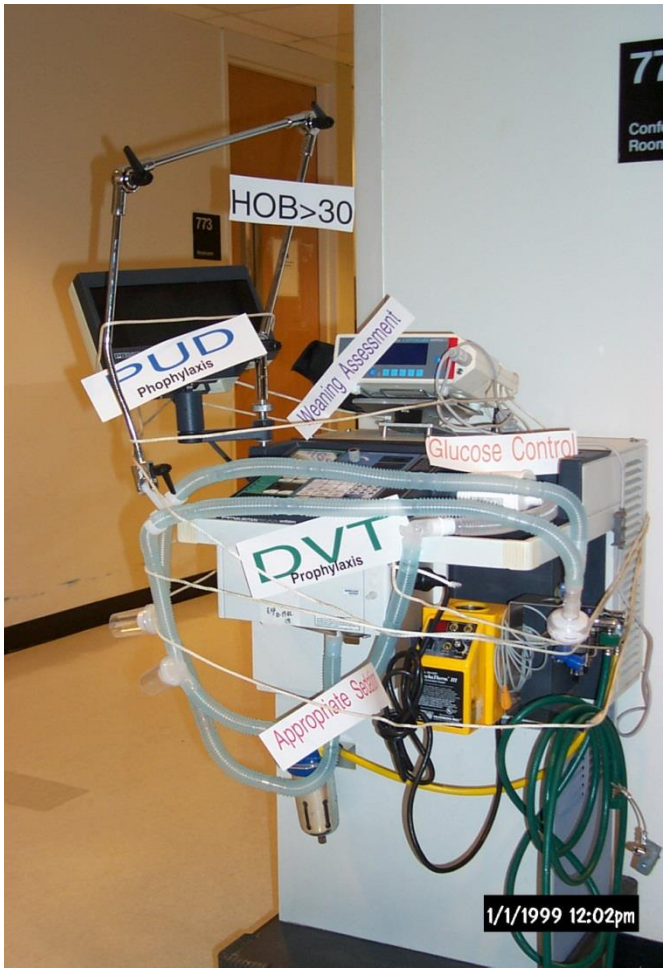
Prevention of HAP

Quinn B, Baker D.: Comprehensive oral care helps prevent hospital-acquired nonventilator pneumonia. American Nurse Today. 2015. Vol. 10. No. 3. Pgs. 18-23

Prevention Strategies

Ventilator Bundle (IHI)

- Elevation of HOB ≥ 30 degrees
- DVT prophylaxis
- Peptic Ulcer Prophylaxis (PUP)
- Daily 'Sedation Vacation' and readiness to extubate assessment
  - Daily screening of respiratory function
    - SBT
- Oral Care



Institute for Healthcare Improvement

Prevention of Ventilator-Associated Pneumonia: The Multimodal Approach of the Spanish ICU "Pneumonia Zero" Program*

Francisco Álvarez-Lerma, MD, PhD[1]; Mercedes Palomar-Martínez, MD, PhD[2]; Miguel Sánchez-García, MD, PhD[3]; Montserrat Martínez-Alonso, PhD[4,5]; Joaquín Álvarez-Rodríguez, MD, PhD[6]; Leonardo Lorente, MD, PhD[7]; Susana Arias-Rivera, RN[8]; Rosa García, RN[9]; Federico Gordo, MD, PhD[10]; José M. Añón, MD, PhD[11]; Rosa Jam-Gatell, RN, MSN[12]; Mónica Vázquez-Calatayud, RN, MSc[13]; Yolanda Agra, MD, PhD[14]

Critical Care Medicine, February 2018 46(2): 181-188.

Pneumonia Zero Program

- Prospective, interventional, multicenter study.
- 181 ICUs throughout Spain.
- 10 VAP prevention measures were implemented (7 mandatory and 3 recommended).
- National ICU-Acquired Infections Surveillance Study
- VAP from the incorporation of the ICUs to the project, every 3 months, compared with data of the ENVIN registry (April–June 2010) as the baseline period. VAP rates adjusted by characteristics of the hospital

Alvarez-Lerma et al Critical Care Medicine, February 2018 46(2): 181-188

Results

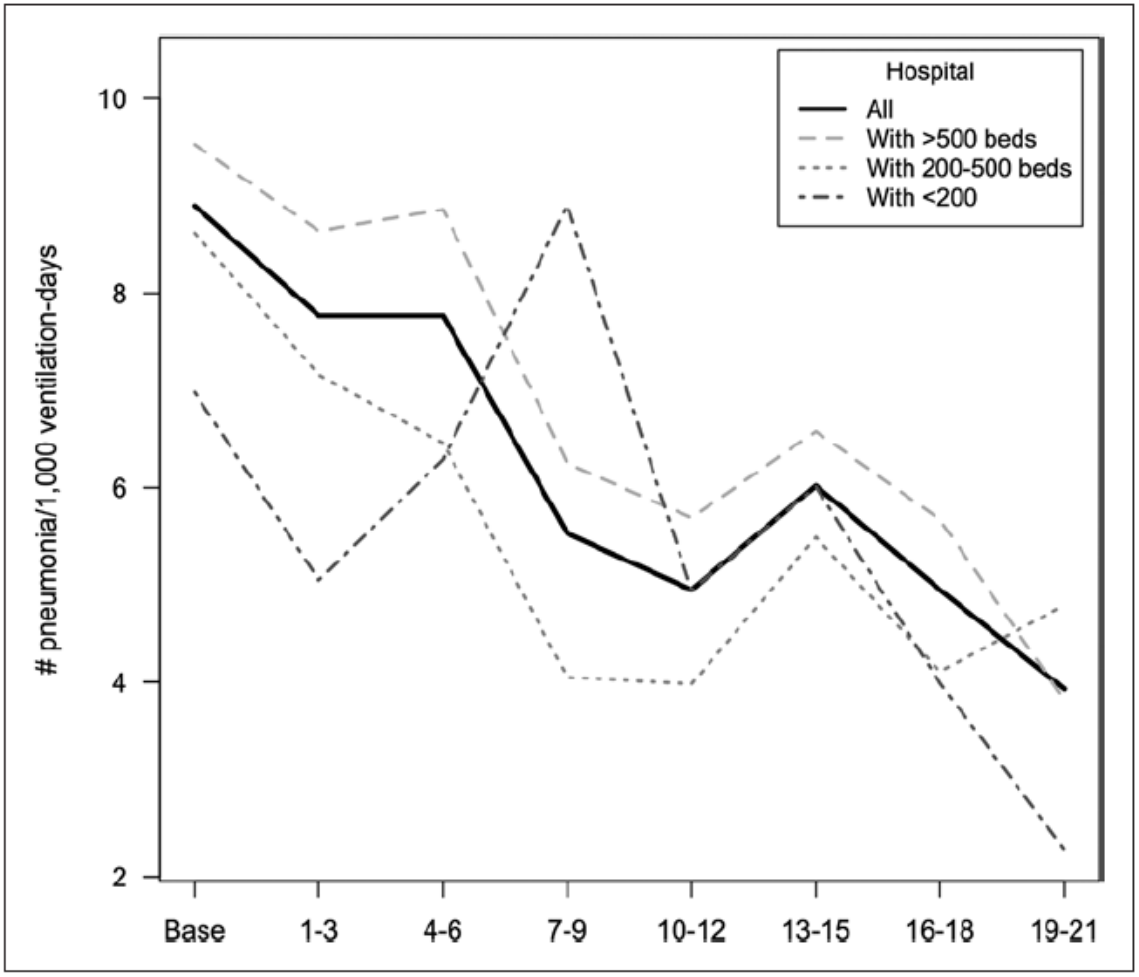
- 181 participating ICUs (75% of all ICUs in Spain)
- 171,237 ICU admissions, an artificial airway was present on 505,802 days (50.0% of days of stay in the ICU).
- 3,474 VAP episodes diagnosed in 3,186 patients.
- VAP incidence rate decreased from 9.83 (95% CI, 8.42–11.48) per 1,000 ventilator days in the baseline period to 4.34 (95% CI, 3.22–5.84) after 19–21 months of participation.
- Implementation of the bundle measures included in the "Pneumonia Zero" project resulted in a significant reduction of more than 50% of the incidence of ventilator-associated pneumonia in Spanish ICUs. This reduction was sustained 21 months after implementation.

Alvarez-Lerma et al Critical Care Medicine, February 2018 46(2): 181-188

Individual Components of VAP Prevention Bundle

Seven Basic Mandatory Measures	Three Highly Recommended Measures
1. Education and training in appropriate airway management.[a]	1. Selective decontamination of the digestive tract or selective oropharyngeal decontamination.
2. Strict hand hygiene with alcohol solutions before airway management.	2. Continuous aspiration of subglottic secretions.
3. Control and maintenance of cuff pressure.	3. Short course (2-3 doses) of systemic antibiotics during intubation of patients with previous decreased consciousness.
4. Oral hygiene with chlorhexidine.	
5. Semirecumbent positioning. Avoidance of 0° supine positioning if possible.	
6. Promoting procedures and protocols that safely avoid or reduce duration of mechanical ventilation.[b]	
7. Avoidance of elective changes of ventilator circuits, humidifiers, and endotracheal tubes.	

Results



Alvarez-Lerma et al Critical Care Medicine, February 2018 46(2): 181-188

REDUCING VENTILATOR-ASSOCIATED PNEUMONIA THROUGH ADVANCED ORAL-DENTAL CARE: A 48-MONTH STUDY

Robert Garcia, BS, MMT (ASCP), CIC, et al.

Objective: To determine the effect of comprehensive oral and dental care system and protocol on the rate of VAP. (Tooth Brushing Q2, Swabbing Q4, Deep Suctioning Q6, Daily Assessment)

Methods: Patients on ventilation for more than 48 hours were studied for 2 (24 month) periods. The first 24 months with no system & protocol (pre-intervention period). The second 24 months with system & protocol (intervention period).

Results: Compliance with protocol components exceeded 80%. The rate of VAP dropped from 12/1000 vent days to 8/1000 vent days. Duration of ventilation, LOS in ICU, and mortality differed significantly between groups.

Conclusion: Advanced tools, a comprehensive oral care protocol, and staff compliance with protocol can significantly reduce rates of VAP and associated costs.


AJCC American Journal of Critical Care

Reducing Ventilator-Associated Pneumonia Through Advanced Oral-Dental Care: A 48-Month Study

Robert Garcia, Linda Jendresky, Larry Colbert, Althea Bailey, Mohammed Zaman and Mujbur Majumder

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AMERICAN ASSOCIATION of CRITICAL-CARE NURSES

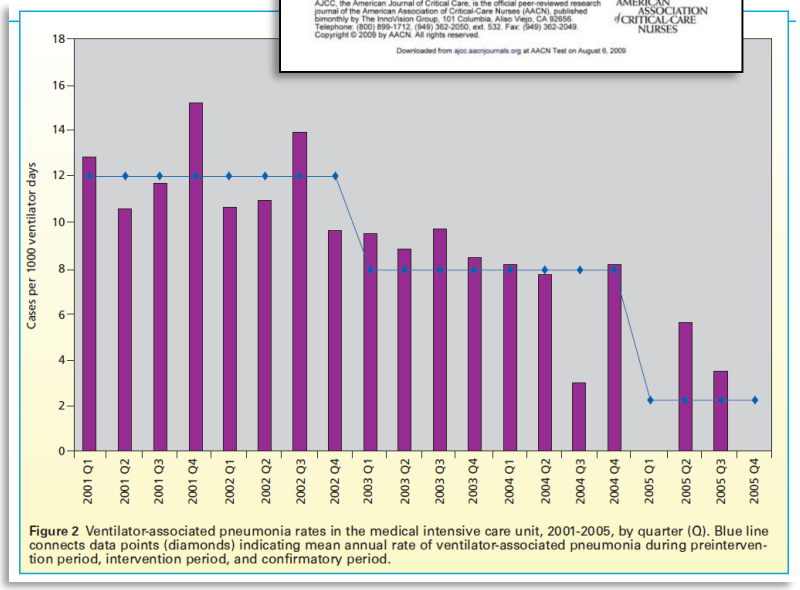


Figure 2 Ventilator-associated pneumonia rates in the medical intensive care unit, 2001-2005, by quarter (Q). Blue line connects data points (diamonds) indicating mean annual rate of ventilator-associated pneumonia during preintervention period, intervention period, and confirmatory period.

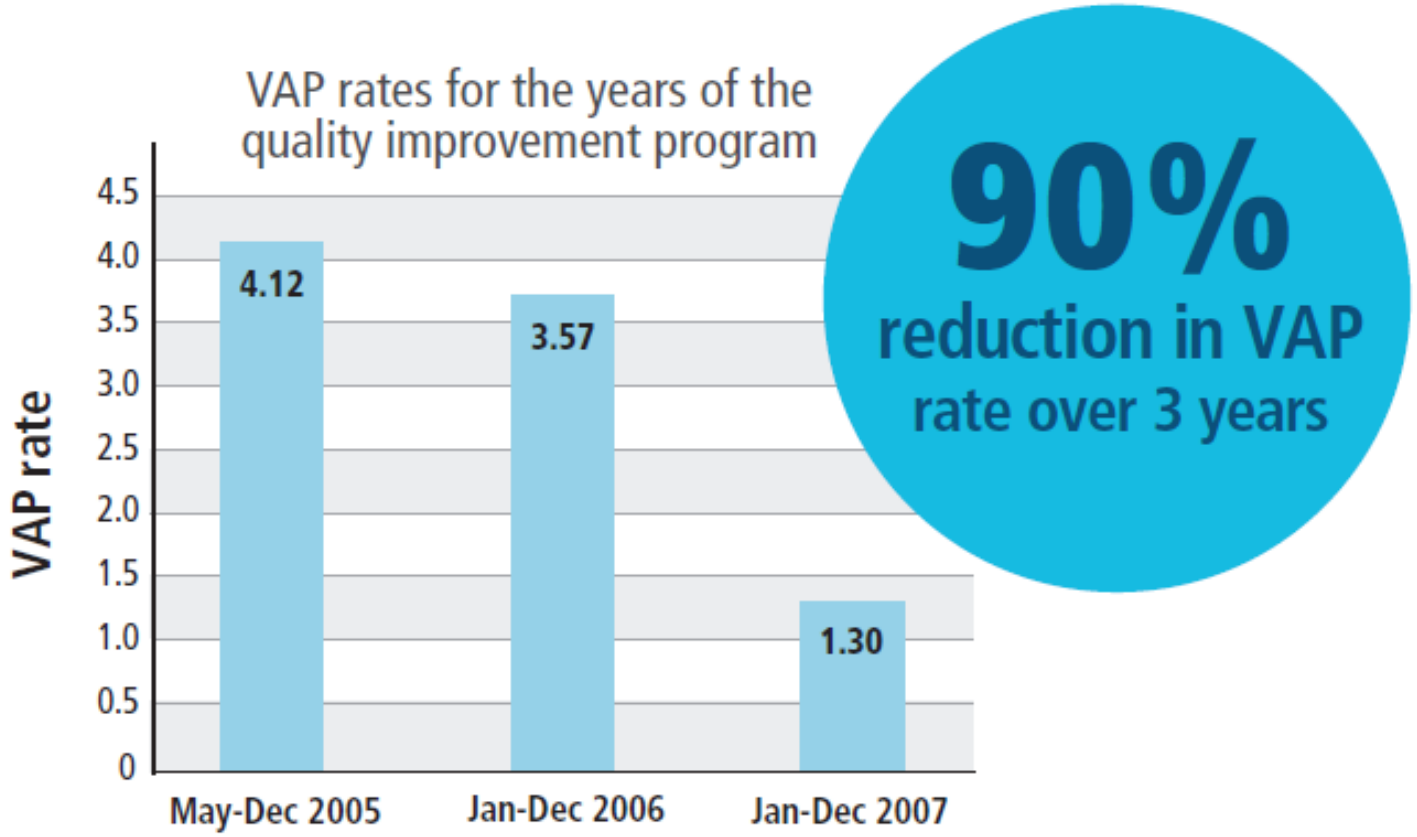
Published in American Journal of Critical Care, November 2009 18 (6): 523-32

Oral Care

- Dental plaque and bacterial colonization of pathogens is directly related to microaspiration of bacteria into the lungs.
- A moist environment in the mouth maintains normal oropharyngeal bacteria, preventing overgrowth of pathogenic bacteria.
- Frequent oral care, including twice a day brushing of the teeth, found a 69% reduction in respiratory tract infections.

Stonechypher, 2010. Crit Care Nurs Q;33(4):339-347

VENTILATOR-ASSOCIATED PNEUMONIA AND ORAL CARE: A SUCCESSFUL QUALITY IMPROVEMENT PROJECT



Hutchins K, George Karras G, Erwin J, Sullivan KL, Ventilator-associated pneumonia and oral care: A successful quality improvement project, Am J Infect Control 2009;37:590-7

Oral intensity: Reducing non-ventilator-associated hospital-acquired pneumonia in care-dependent neurologically impaired patients

Volume 35, Issue 2, 2013 – Canadian Journal of Neuroscience Nursing, Trudy Robertson, RN, CNN(c)

Oral intensity: Reducing non-ventilator-associated hospital-acquired pneumonia in care-dependent, neurologically impaired patients

Trudy Robertson, RN, MSN, CNN(c), and Dulcie Carter, BSc, MMedSci, RSLP, CASLPA(c)

Abstract

Introduction: The purpose of this point-of-care study was to test the efficacy of a prevention-based oral care protocol in reducing non-ventilator-associated hospital-acquired pneumonia in a neurosurgical population outside the critical care environment. The researchers hypothesized that an enhanced oral care protocol would decrease the incidence of pneumonia.

Methods: This quasi-experimental, comparative study took place on an acute neurosurgical unit at a tertiary care trauma hospital in Western Canada. Subjects were non-intubated, care-dependent adults with a primary diagnosis of neurologic injury/insult, and at high risk for pneumonia. The prospective study group comprised 34 subjects; two subjects were excluded from the study analysis. The retrospective study group comprised 51 subjects.

Data were collected for both groups for a six-month period. Retrospective data were collected through chart review. The prospective group were eligible neurosurgical patients who received the enhanced oral care protocol. Data collection tools were developed and diagnostic criteria for hospital-acquired pneumonia were determined. The pneumonia rates between subjects who received standard oral care (retrospective group) and those who received an enhanced, prevention-based, oral care protocol (prospective group) were compared.

Results: A statistically significant decrease in the pneumonia rate occurred in the prospective group ($p<0.05$).

Discussion: An enhanced oral care protocol was beneficial in reducing the incidence of non-ventilator-associated hospital-acquired pneumonia.

Implications: Nurses play a vital role in preventing hospital-acquired pneumonia. Foundational nursing practices, such as regular oral hygiene, are important aspects of care in preventing nosocomial infections and related costs, optimizing health, and promoting quality care.

Key words: non-ventilator-associated hospital-acquired pneumonia, oral hygiene, neurological injury/insult, care-dependent, multi-disciplinary, clinical nurse specialist

L'intensité buccale : réduire la pneumonie nosocomiale non-acquise sous ventilation chez les patients souffrant de déficiences neurologiques et dépendant de soins

Introduction : L'objectif de cette étude menée sur le lieu d'intervention était d'évaluer l'efficacité d'un protocole de soins d'hygiène buccale préventif destiné à une population en neurochirurgie située en dehors d'un environnement de soins intensifs afin de réduire les pneumonies nosocomiales non-acquises sous ventilation. Les chercheurs ont émis l'hypothèse qu'un protocole de soins buccaux amélioré diminuerait l'incidence de pneumonie.

Méthodes : Cette étude comparative s'est déroulée dans l'unité de soins neurologiques de courte durée d'un hôpital de traumatologie tertiaire de l'Ouest du Canada. Les sujets étaient des adultes non-intubés, dépendant de soins, qui avaient reçu un diagnostic primaire de lésion/insulte neurologique et présentaient un fort risque de contracter une pneumonie. Cette étude de groupe prospective comprenait 34 sujets; 2 sujets ont été exclus de l'analyse de l'étude. L'étude de groupe rétrospective comprenait 51 sujets.

Des données ont été recueillies pour les deux groupes au cours d'une période de 6 mois. Les données collectives ont été recueillies au moyen d'un examen des dossiers. Le groupe prospectif était composé de patients en neurochirurgie admissibles et qui ont reçu le protocole de soins d'hygiène buccale amélioré. On a créé les outils de collecte des données puis déterminé les critères de diagnostic des pneumonies nosocomiales. On a comparé les taux de pneumonie entre les sujets qui ont reçu des soins buccaux standards (groupe rétrospectif) et ceux qui ont reçu le protocole de soins d'hygiène buccale préventif amélioré (groupe prospectif).

Résultats : Il s'est produit une importante baisse statistique des taux de pneumonie dans le groupe prospectif ($p<0,05$).

Discussion : Un protocole de soins d'hygiène buccale améliorés a aidé à réduire l'incidence des pneumonies nosocomiales non-acquises sous ventilation.

Implications : Le personnel infirmier joue un rôle essentiel lorsqu'il s'agit d'empêcher les pneumonies nosocomiales. Des pratiques de soins infirmiers fondamentales, telles qu'une hygiène buccale régulière, constituent d'importants aspects des soins dans la prévention d'infections nosocomiales et des coûts qui s'ensuivent, l'optimisation de la santé et la promotion de soins de qualité.

Mots-clés : pneumonie nosocomiale non-acquise sous ventilation, hygiène buccale, lésion/insulte neurologique, dépendance aux soins, multidisciplinaire, infirmier(-ière) clinique spécialisée

10 Volume 35, Issue 2, 2013 • Canadian Journal of Neuroscience Nursing

- **Purpose:** Compare the pneumonia rates between subjects who received standard oral care (retrospective group) and those who received an enhanced, prevention-based oral care protocol (prospective group).
- **Results:** A statistically significant decrease in the pneumonia rate occurred in the prospective group ($p< 0.05$).
- **Implications:** Nurses play a vital role in preventing HAP. Foundational nursing practices, such as regular oral hygiene, are important aspects of care in preventing nosocomial infections and related costs, optimizing health, and promoting quality care

Robertson, T. Carter, D.: *Oral Intensity: Reducing non-ventilator-associated hospital-acquired pneumonia in care-dependent, neurologically impaired patients*. Canadian Journal of Neuroscience Nursing. 2013. Vol. 35., No. 2.

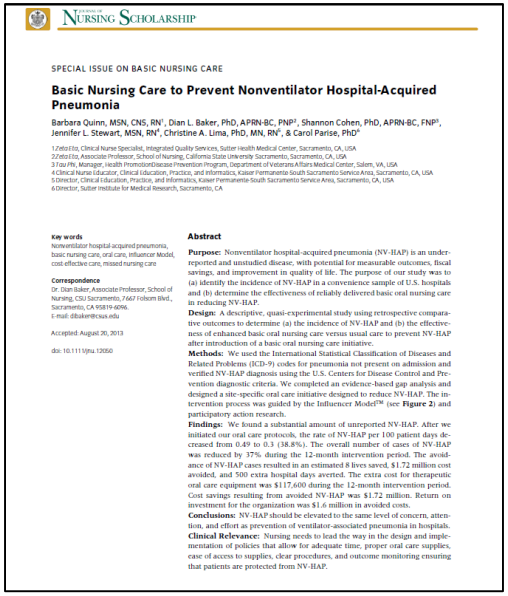
BASIC NURSING CARE TO PREVENT NON-VENTILATOR HOSPITAL-ACQUIRED PNEUMONIA

Barbara Quinn MSN, CNS, RN, Dian L. Baker PhD, APRN-BC, PNP, Shannon Cohen PhD, APRN-BC, FNP, Jennifer L. Stewart MSN, RN, Christine A. Lima PhD, MN, RN, Carol Parise PhD

Purpose: To identify the incidence of NV-HAP in a convenience sample of U.S. hospitals and (b) determine the effectiveness of reliably delivered basic oral nursing care in reducing NV-HAP.

Findings: The rate of NV-HAP per 100 patient days decreased from 0.49 to 0.3 (38.8%). The overall number of cases of NV-HAP was reduced by 37% during the 12-month intervention period. The avoidance of NV-HAP cases resulted in an estimated 8 lives saved, $1.72 million cost avoided, and 500 extra hospital days averted. Return on investment for the organization was $1.6 million in avoided costs.

Conclusion: NV-HAP should be elevated to the same level of concern, attention, and effort as prevention of ventilator-associated pneumonia in hospitals. Nursing needs to lead the way in the design and implementation of policies that allow for adequate time, proper oral care supplies, ease of access to supplies, clear procedures, and outcome monitoring ensuring that patients are protected from NV-HAP.



NURSING SCHOLARSHIP

SPECIAL ISSUE ON BASIC NURSING CARE

Basic Nursing Care to Prevent Nonventilator Hospital-Acquired Pneumonia

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Key words
Nonventilator hospital-acquired pneumonia, basic nursing care, oral care, Influencer Model, cost-effective care, missed nursing care

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Abstract

Purpose: Nonventilator hospital-acquired pneumonia (NV-HAP) is an underreported and unstudied disease, with potential for measurable outcomes, fiscal savings, and improvement in quality of life. The purpose of our study was to (a) identify the incidence of NV-HAP in a convenience sample of U.S. hospitals and (b) determine the effectiveness of reliably delivered basic oral nursing care in reducing NV-HAP.

Design: A descriptive, quasi-experimental study using retrospective comparative outcomes to determine (a) the incidence of NV-HAP and (b) the effectiveness of enhanced basic oral nursing care versus usual care to prevent NV-HAP after introduction of a basic oral nursing care initiative.

Methods: We used the International Statistical Classification of Diseases and Related Problems (ICD-9) codes for pneumonia not present on admission and verified NV-HAP diagnosis using the U.S. Centers for Disease Control and Prevention diagnostic criteria. We completed an evidence-based gap analysis and designed a site-specific oral care initiative designed to reduce NV-HAP. The intervention process was guided by the Influencer Model™ (see **Figure 2**) and participatory action research.

Findings: We found a substantial amount of unreported NV-HAP. After we initiated our oral care protocols, the rate of NV-HAP per 100 patient days decreased from 0.49 to 0.3 (38.8%). The overall number of cases of NV-HAP was reduced by 37% during the 12-month intervention period. The avoidance of NV-HAP cases resulted in an estimated 8 lives saved, $1.72 million cost avoided, and 500 extra hospital days averted. The extra cost for therapeutic oral care equipment was $117,600 during the 12-month intervention period. Cost savings resulting from avoided NV-HAP was $1.72 million. Return on investment for the organization was $1.6 million in avoided costs.

Conclusions: NV-HAP should be elevated to the same level of concern, attention, and effort as prevention of ventilator-associated pneumonia in hospitals.

Clinical Relevance: Nursing needs to lead the way in the design and implementation of policies that allow for adequate time, proper oral care supplies, ease of access to supplies, clear procedures, and outcome monitoring ensuring that patients are protected from NV-HAP.

Published in the Journal of Nursing Scholarship, 2013 00:00, 1-9

Professional organizations are now recognizing comprehensive oral care as key to addressing VAP and HAP

APIC 2009 Guide to the Elimination of Ventilator-Associated Pneumonia[1]

Key prevention strategies:

- *Perform routine antiseptic mouth care*

Example mouth care and documentation form includes the following:

- **Brush teeth q12°**
- **Provide oral care every 2 to 4 hours with antiseptic**
- **Apply mouth moisturizer to oral mucosa**

IHI Guidelines[3] Recommendations

Doctors and nurses can help prevent VAP by using a bundle of 5 "care steps." The bundle of care steps are as follows:

- *Elevation of the Head of the Bed to between 30° - 45°*
- *Daily "Sedative Interruption" and Daily Assessment of Readiness to Extubate*
- *Peptic Ulcer Disease (PUD) Prophylaxis (unless contraindicated)*
- *Deep Venous Thrombosis (DVT) Prophylaxis*
- ***Daily Oral Care with Chlorhexidine***

CDC Guidelines for Preventing Healthcare-Associated Pneumonia[2*]

*"... **Develop and implement a comprehensive oral-hygiene program** (that might include use of an antiseptic agent) for patients in acute-care settings or residents in long-term care facilities who are at risk for health-care associated pneumonia (II)"*

AACN Procedure Manual for Critical Care – Oral Care Interventions; 2005, 2010 [4,5]

*"Assess oral cavity and lips every 8 hours, and **perform oral care every 2 to 4 hours and as needed**. With oral care, assess for buildup of plaque on teeth or potential infection related to oral abscess."* [4]

"Initiate oral hygiene with a pediatric or adult (soft) toothbrush, at least twice a day. Gently brush patient's teeth to clean and remove plaque from teeth." [4]

"Use toothpaste or cleansing solution that assists in the breakdown of debris."[5]

"Cleansing solution should contain additives that assist in the breakdown of mucus in the mouth. Sodium bicarbonate assists in the removal of debris accumulation on oral tissue and teeth" [5]

"In addition to brushing twice daily, use oral swabs with a 1.5% hydrogen peroxide solution to clean mouth every 2 to 4 hours."[4]

*"**Antiseptic oral rinses** (chlorhexidine, cetylpyridinium chloride [CPC], **added after brushing or done in conjunction with comprehensive oral care did achieve elimination of VAP**."*[4]

"After each cleansing, apply a mouth moisturizer to the oral mucosa and lips to keep tissue moist."[4]

"Suction oral cavity/pharynx frequently."[4] In addition to other interventions

1. APIC 2009 Guide to the Elimination of Ventilator-Associated Pneumonia, pp. 38, 40. **2.** Tablan OC, et al., Guidelines for preventing health-care--associated pneumonia, 2003, Recommendations of CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC), 2003. **3.** How-to Guide: Prevent Ventilator-Associated Pneumonia. Cambridge, MA. Institute for Healthcare Improvement; 2012. **4.** Scott JM, Vollman KM, Endotracheal tube and oral care. In DJ Lynn- McHale Wiegand and KK Carlson (Eds.) AACN Procedure Manual for Critical Care, Fifth Ed., pp. 28-33., Elsevier Saunders, St. Louis, MO. Level B: Well-designed, controlled studies with results that consistently support a specific action, intervention, or treatment. **5.** Vollman KM, Lou Sole M, Endotracheal tube and oral care. In DJ Lynn- McHale Wiegand (Ed.) AACN Procedure Manual for Critical Care, Sixth Ed., pp. 31-38., Elsevier Saunders, St. Louis, 2011.

High Impact Intervention Care bundle to reduce ventilation-association pneumonia

Aim to reduce the incidence of ventilation-associated pneumonia (VAP).

The aim of the care bundle, as set out in this high impact intervention, is to ensure appropriate and high quality patient care. Regular auditing of the care bundle actions will support cycles of review and continuous improvement in care settings.

http://webarchive.nationalarchives.gov.uk/20120118171705/http://hcai.dh.gov.uk/files/2011/03/2011-03-14-HII-Ventilator-Associated-Pneumonia-FINAL.pdf

Importance of Bundles

- Should be part of an overall strategy to reduce healthcare-acquired infections in the care setting.
- Should also include hand hygiene, the use of personal protective equipment and good environmental cleaning.
- At the present time, this ventilator bundle should be used as dynamic standardisation of best practice in the management of a ventilated patient.

Why use the care bundle?

- Derived from evidence-based guidance and expert advice.
- The purpose is to act as a way of improving and measuring the implementation of key elements of care.
- The risk of VAP increases when one or more elements are excluded or not performed.

Elements of the Care Process

- Elevation of HOB
  - 30-45 degrees unless contraindicated
- Sedation level Assessment
  - Reduce sedation for assessment at least daily
- Oral Hygiene
  - Clean with chlorhexidine q 6 hours
    - wait 2 hours btwn brushing (CHG inactivated by toothpaste)
  - Brush teeth every 12 hours
- Subglottic aspiration
  - Tracheal tube with SSD if intubated >72 hours.
  - SSD every 1-2 hours
- Tracheal tube cuff pressure
  - Measure cuff pressure q 4 hours, maintain 20-30 cm H2O
- Stress ulcer prophylaxis
  - Only to high-risk patients, review prophylaxis daily.

http://webarchive.nationalarchives.gov.uk/20120118171705/http://hcai.dh.gov.uk/files/2011/03/2011-03-14-HII-Ventilator-Associated-Pneumonia-FINAL.pdf

NHS Scotland

- Review all patients sedation each day and, if appropriate, stop (Category 1B)
- Assess all patients for weaning and extubation each day each day (Category 1B)
- Avoid supine position; aim to have patient head up at least 30-45^{0} (Category 1A)
- Consider using chlorhexidine as part of daily mouth care (Category 1A)
- Ensure that subglottic secretion drainage is used in patients likely to be ventilated for more than 48 hours (Category A)

https://www.hps.scot.nhs.uk/resourcedocument.aspx?id=4366

The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia

- Elevation of Head of Bed
- Daily sedation interruption and assessment of readiness to extubate
- Use of subglottic secretion drainage
- Avoidance of scheduled ventilator circuit changes

Hellyer, TP, Ewan, V., Wilson, P., Simpson, AJ. The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. J Intensive Care Soc. 2016 Aug; 17(3): 238–243.

ICS Guidelines Explanation

- Paucity of evidence on outcomes for tooth brushing alone, since many studies have been performed in the context of CHX as standard care.
- "Oral hygiene remains important in ventilated patients in order to remove dental plaque, for patient comfort, and to promote a 'normal' microbial community."
- Oral hygiene should continue to be provided even if not using CHX.
- Toothbrushing in the ICU patients is under-researched, no clear signal of adverse outcome from toothbrushing.
- In the absence of clear evidence base for optimal oral care, removal of dental plaque and other debris from teeth, tongue and oral mucosa with a foam swab or a toothbrush appears unlikely to be harmful.

Hellyer, TP, Ewan, V., Wilson, P., Simpson, AJ. The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. J Intensive Care Soc. 2016 Aug; 17(3): 238–243.

Cochrane Review

- High quality evidence that chlorhexidine, either as a mouth rinse or a gel, reduces the risk of VAP from 24% to about 18%.
- For every 17 people on ventilators for more than 48 hours in intensive care, the use of oral hygiene care including chlorhexidine will prevent one person developing VAP.
- No evidence that oral hygiene care with chlorhexidine makes a difference to the numbers of patients who die in ICU, or to the number of days on mechanical ventilation or days in ICU.

Cochrane review. Oral hygiene care for critically ill patients to prevent VAP 2017

Oral hygiene and pneumonias in nursing home elderly

- Systematic review (15 studies) on preventive effect of oral hygiene on pneumonia and respiratory tract infection on elderly people in hospitals and nursing homes. Variation in the design/quality of studies.
- The RCTs revealed positive preventive effects of oral hygiene on pneumonia and respiratory tract infection in hospitalized elderly people and elderly nursing home residents.
  - ARRs from 6.6% to 11.7% and NNTs from 8.6 to 15.3 individuals.
- Mechanical oral hygiene has a preventive effect on mortality from pneumonia and non-fatal pneumonia in hospitalized elderly people and elderly nursing home residents.
- 1 in 10 cases of death from pneumonia in elderly nursing home residents may be prevented by improving oral hygiene.

Sjogren P. et al. J of Am Geri Soc; 56(11):2124-30, 2008

Denture wearing during sleep doubles risk of pneumonia in the very elderly

- Poor oral health and hygiene are increasingly recognized as major risk factors for pneumonia among the elderly.
- Objective: To identify modifiable oral health-related risk factors, associations of oral health behaviors and incident pneumonia in the community-living very elderly (>85 yo)
- 524 randomly selected seniors (228 men and 296 women; mean age 87.8 years)
- Examined for oral health status and oral hygiene behaviors as well as medical assessment, including blood chemistry analysis, and followed up annually until first hospitalization for or death from pneumonia.

Iinuma T et al. J of Dental Research. 94(3 Suppl):28S-36S, 2015

Denture wearing in elderly

- 3-year period, 48 events associated with pneumonia (20 deaths and 28 acute hospitalizations).
- Among 453 denture wearers, 186 (40.8%) who wore their dentures during sleep were at higher risk for pneumonia than those who removed their dentures at night.
- Swallowing difficulties and overnight denture wearing were independently associated with an approximately 2.3-fold higher risk of the incidence of pneumonia.
- Denture wearers at night more likely to have tongue and denture plaque, gum inflammation, positive culture for *Candida albicans*, and higher levels of circulating interleukin-6.
- Denture wearing during sleep is associated with oral inflammatory and microbial and pneumonia, suggesting potential implications of oral hygiene programs for pneumonia prevention in the community.

Initiated easy protocol to ensure each patient type received comprehensive oral care.

Oral-care protocol

Sutter Medical Center developed the oral-care protocol shown here to help prevent hospital-acquired pneumonia. When providing oral care, follow these guidelines:

- Always use personal protective equipment when assisting patients with mouth care, including gloves, mask, and face shield.
- Know that disposable swabs are for one-time use only. Don't soak them in a cup for later reuse.
- Document oral care in the patient record.

Patient description	Equipment	Procedure	Frequency
Patient is: • able to perform self-care (or needs minimal assistance) *AND* • is able to expectorate.	• Soft toothbrush • Plaque-removing toothpaste • Alcohol-free antiseptic oral rinse • Mouth moisturizer and one or two swabs to apply it	• Set patient up at sink or in bed with all equipment. • Instruct patient to brush teeth for 1 to 2 minutes. • Instruct patient to swish and spit antiseptic oral rinse. • If desired, moisturize interior of oral cavity and lips using a swab as needed. • Discard disposable equipment and swab in appropriate receptacle.	After each meal and before bedtime. If patient can't receive oral intake, provide oral care in morning, mid-day, evening, and bedtime.
Patient is: • dependent for oral care *OR* • unable to expectorate *AND* • at risk for aspiration.	• Suction toothbrush • Alcohol-free antiseptic oral rinse • Mouth moisturizer and one or two swabs to apply it	• Moisten suction toothbrush in antiseptic oral rinse. • Connect suction toothbrush to continuous suction. • Brush teeth for 1 to 2 minutes. • Suction debris from mouth. • Using swab, apply moisturizer to interior of oral cavity and lips. • Discard disposable equipment in appropriate receptacle.	Same as above
Patient is: • dependent for oral care *AND* • on a mechanical ventilator.	• Suction toothbrush or swab • Oral cleansing solution in toothbrush kit • Mouth moisturizer • Chlorhexidine oral rinse, if patient is on ventilator or if ordered	• Perform suction as needed to remove oropharyngeal secretions that may have migrated down tube and settled atop cuff. • Moisten suction toothbrush with oral cleansing solution; connect suction toothbrush to continuous suction. • Remove debris and clean gums, tongue, and inside of cheeks. • Suction debris from mouth. • Using swab, apply moisturizer to interior of oral cavity and lips. • Discard disposable equipment and swab in appropriate receptacle.	Every 4 hours and as needed to remove oral debris. If patient is on ventilator, use chlorhexidine rinse as oral care solution in morning and at bedtime.

Quinn B, Baker D.: Comprehensive oral care helps prevent hospital-acquired nonventilator pneumonia. American Nurse Today. 2015. Vol. 10. No. 3. Pgs. 18-23

AACN PROCEDURE MANUAL FOR CRITICAL CARE—ORAL CARE INTERVENTIONS, 2014

- Initiate oral hygiene with a pediatric or adult (soft) toothbrush, at least twice a day. Gently brush patient's teeth to clean and remove plaque from teeth.
- In addition to brushing twice daily, use oral swabs with a 1.5% hydrogen peroxide solution to clean mouth every 2 to 4 hours.
- After each cleansing, apply a mouth moisturizer to the oral mucosa and lips to keep tissue moist.
- Suction oral cavity and pharynx frequently.
- Antiseptic oral rinses (chlorhexidine, cetylpyridinium chloride [CPC]), added after brushing or done in conjunction with comprehensive oral care did achieve elimination of VAP.

Comprehensive Oral Hygiene Program

- Brushing teeth (includes gums, palate and tongue)
  - Use of agents to aid in removal of plaque and debris
- Deep oropharyngeal suctioning or subglottic secretion drainage
- Use of antiseptic agents
- Moisturize mucous membranes

Meta-analysis Subglottic Secretion Drainage

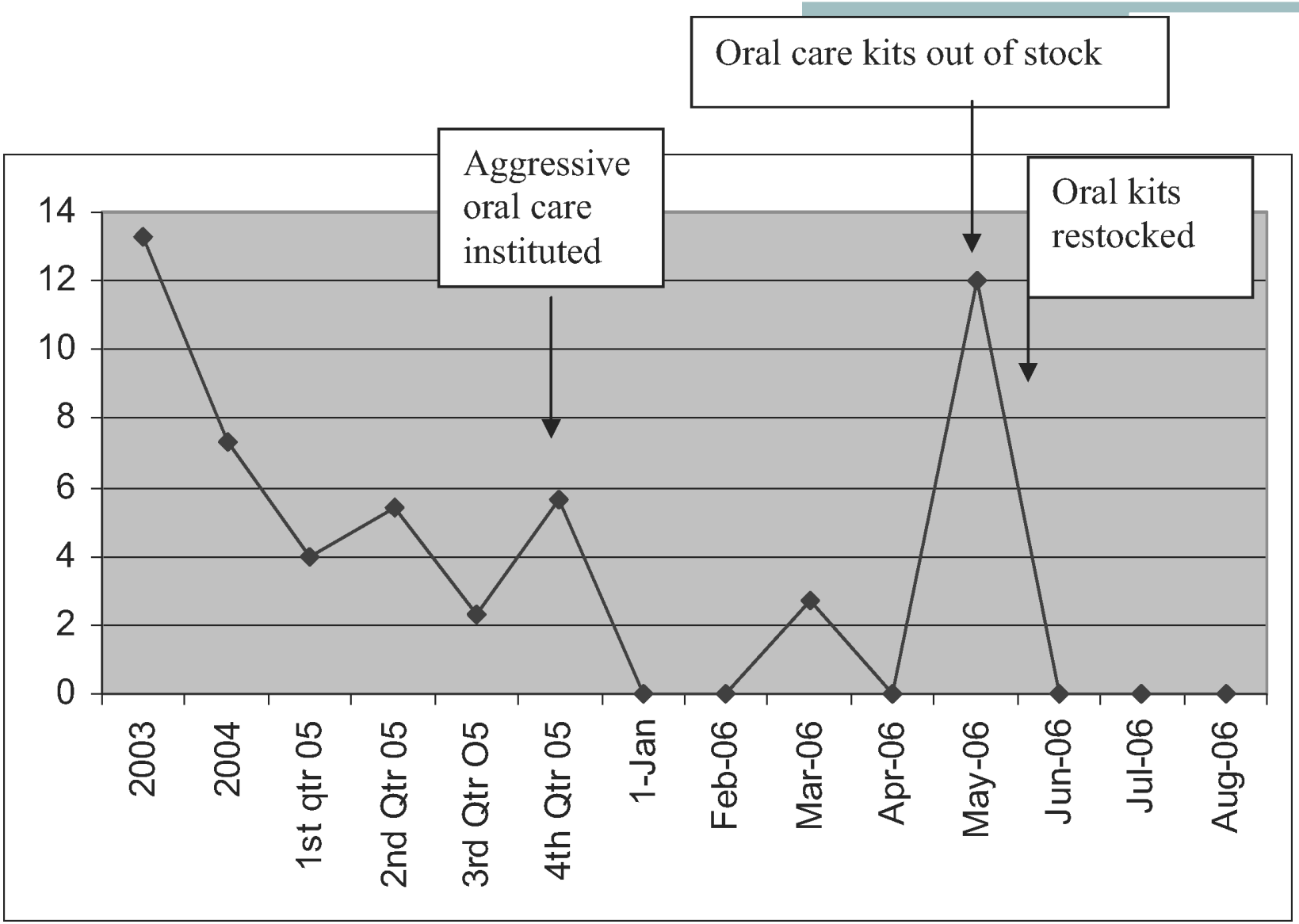
- Pooled studies 848 cases in experimental group and 861 in control group
- 52% risk reduction development of VAP
- Extubation 2 days sooner than control group
- Decreased LOS in ICU by 3 days
- No significant difference in mortality

Leasure, A.R. 2012. DCCN; 31(2):102-117

Deep Oral Suctioning

- Performance improvement initiative
- Neuroscience Critical Care Unit
- Rates of VAP decreased significantly with institution of comprehensive oral hygiene program, specifically related to deep oropharyngeal suctioning.

Powers, J., Brower, A., Tolliver, S 2007. Impact of Oral Hygiene on Prevention of Ventilator-associated Pneumonia in Neuroscience Patients *J Nurs Care Qual;* 22(4): 316–321



Powers, J., Brower, A., Tolliver, S 2007. Impact of Oral Hygiene on Prevention of Ventilator-associated Pneumonia in Neuroscience Patients *J Nurs Care Qual;* 22(4): 316–321

Specialty Endotracheal Tubes

- SSD ETTs
- Silver coated ETTs
- Tapered cuffs

Strategies to Decrease Risk of HAP

- Standardized ventilator weaning protocol
- Minimize aspiration of contaminated secretions
  - HOB elevation
  - Deep suctioning or SSD ETTs for MV patients
  - Clear ventilator tube condensate to avoid back wash
  - Sucralfate or H2 blockers until enterally fed
- Comprehensive oral hygiene program for all patients
  - Tooth brushing (including gums and tongue)
  - Irrigation and suctioning of oropharynx
  - Antiseptic rinse twice daily recommended
- Encourage frequent hand washing
- Education and compliance monitoring in ICU
- Early mobility

Minei et al. 2006 J of Trauma, 60(5): 1106-1113.

JONA
Volume 48, Number 5, pp 285-291

THE JOURNAL OF NURSING ADMINISTRATION

A Retrospective Study of Non–Ventilator-Associated Hospital Acquired Pneumonia Incidence and Missed Opportunities for Nursing Care

Mary Tesoro, DNS, RN-BC
Diane J. Peyser, PhD, RN, NEA-BC
Farley Villarente, MS, FNP, CNOR

Tesoro et al. JONA, 48(5): 285-291

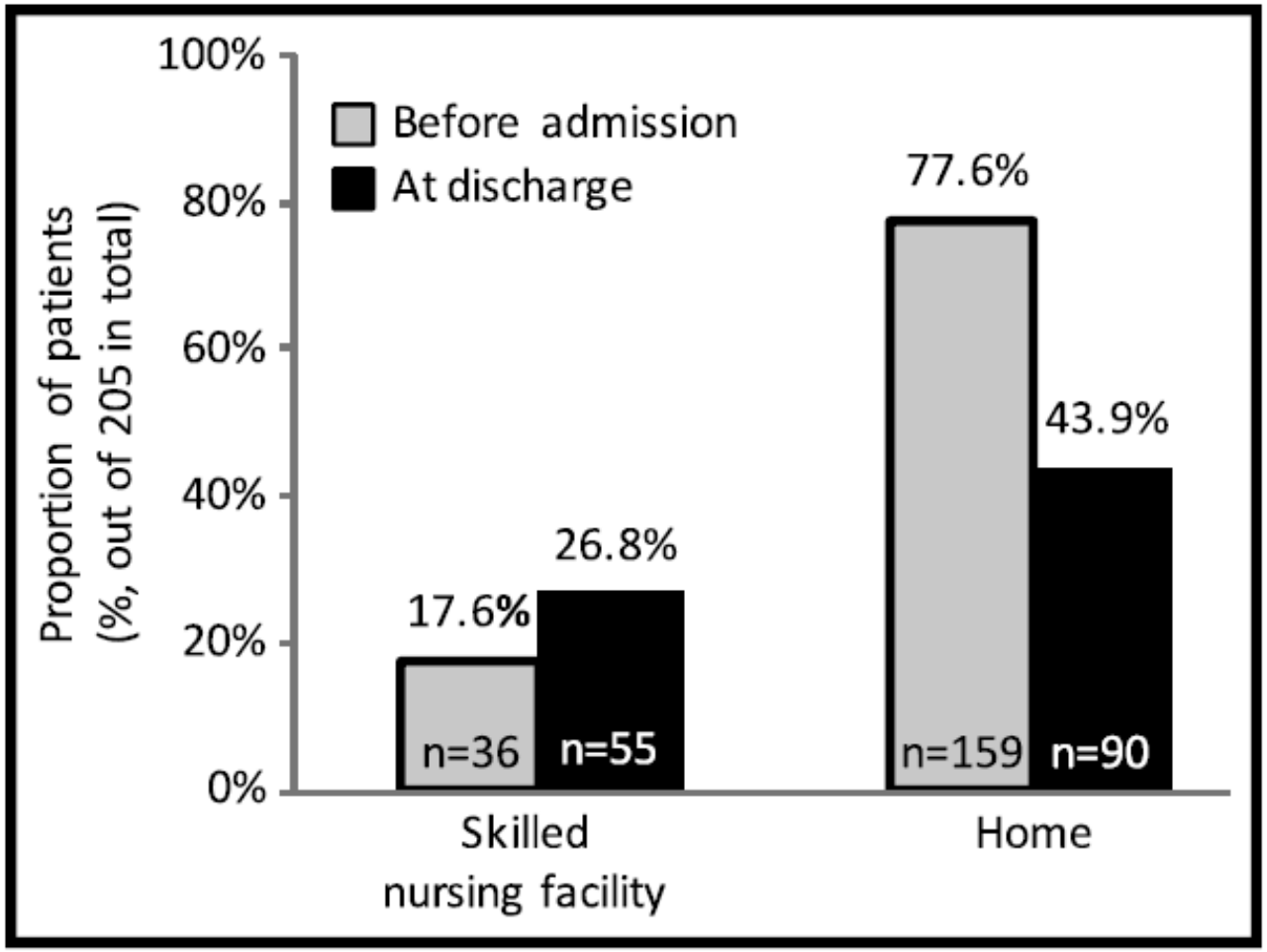
Study and Results

- 205 NV-HAP cases occurred in 1 year at Study Center, equating to an incidence of 0.47 per 1000 patient-days
- Estimated excess cost of $8.2 million. ICU transfer following pneumonia occurred in 15.6% of cases.

Missed Care

- Missed nursing care opportunities especially oral care, may aid NV-HAP prevention.
- Complete nursing care documentation was missing for most patients,
- Oral care undocumented 60.5% of the time.
- Preventable NV-HAP cases and their negative impact on cost and patient outcomes may decrease through improved basic nursing care.

Tesoro et al. JONA, 2018; 48(5): 285-291



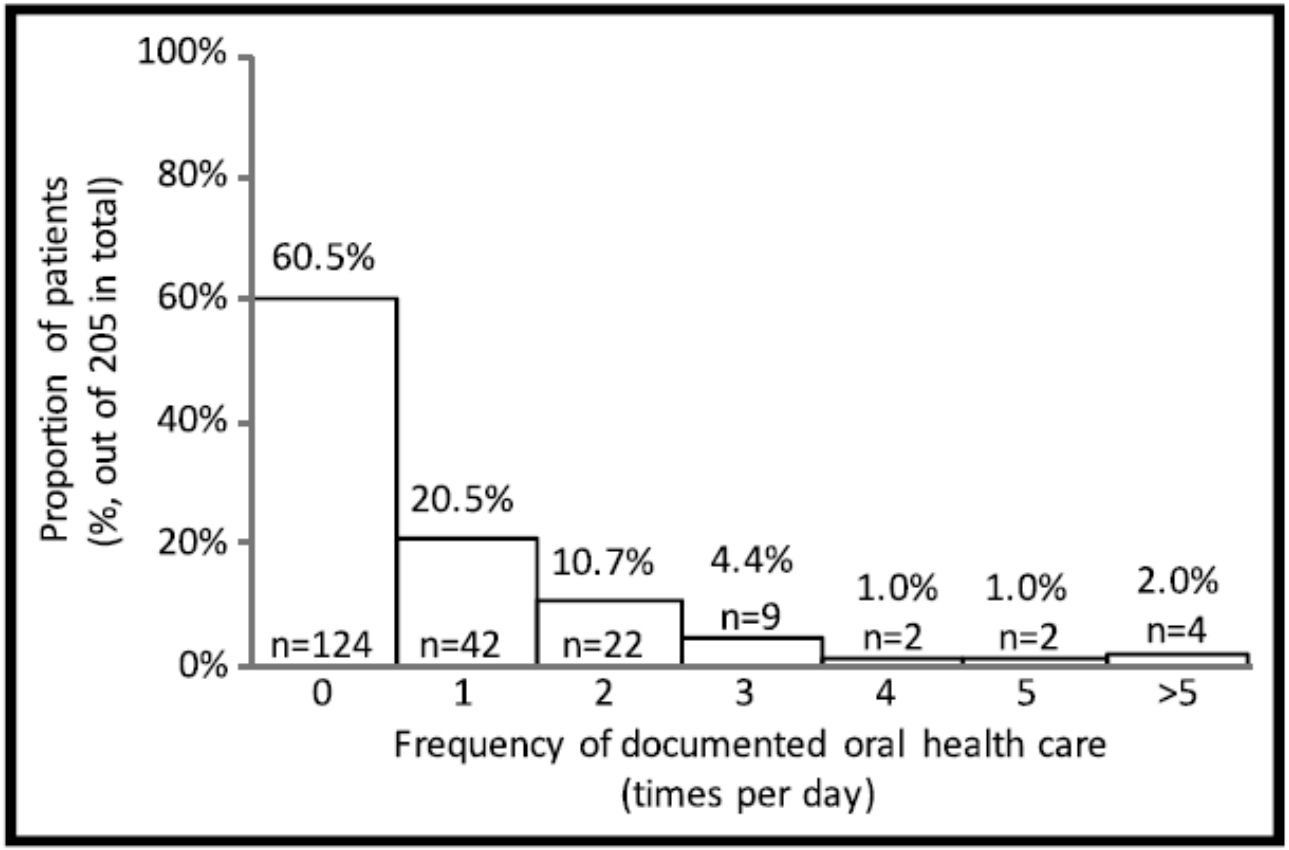
Tesoro et al. JONA, 2018;48(5): 285-291

Table 2. Documentation of Nursing Interventions in the 24 Hours Before Pneumonia Diagnosis for Patients With NV-HAP

Nursing intervention	Documented	Not documented	Not applicable
Head-of-bed elevation	52.2% (107/205)	47.8% (98/205)	—
Out-of-bed activity	32.2% (66/205)	40.0% (82/205)	27.8% (57/205; mobility not allowed)
Incentive spirometry	20.0% (41/205)	80.0% (164/205)	—
Coughing and deep breathing	16.6% (34/205)	83.4% (171/205)	—

Tesoro et al. JONA, 48(5): 285-291

Frequency of documented oral care in 24 hrs before pneumonia diagnosis for NV-HAP



- 60.5% of patients with NV-HAP had no documented oral healthcare
- Only 4% of patients (8/205) received documented oral care at least 4 times a day
- This lack of documented oral healthcare demonstrates a clear missed opportunity of nursing care in potentially preventing NV-HAP.

Tesoro et al. JONA, 2018;48(5): 285-291

“Good ideas are not adopted automatically. They must be driven into practice with courageous patience.”

Admiral Hyman Rickover

Steps in Developing HAP Program

- Identify prevention of HAP as a high-priority task
- Assemble key persons
- Evidence based interventions
- Establish tracking mechanism/Obtain baseline data
- Establish program leadership to ensure program is updated regularly and accountability established
- Provide staff with summary of program
- Organize education program for hospital personnel
- Implementation (strategies to hard-wire practice)
- Sustainability

Make Education Fun!!

Nurse Driven Protocol and EBP

- Nurses play a critical role in facilitating best practice through facilitation of evidence based nursing practices.
- Successful implementation of bundles and prevention strategies results in positive patient outcomes, improved safety, and significant cost savings.

Nurse Driven Protocols Aid in Facilitating Best Practices

Questions?