

DENTAL HYGIENE INTERVENTION TO PREVENT NOSOCOMIAL PNEUMONIAS

Caren M. Barnes, RDH, MS

SORT SCORE			
A	B	C	N/A

SORT, Strength of Recommendation Taxonomy

LEVEL OF EVIDENCE		
1	2	3

See page A8 for complete details regarding SORT and LEVEL OF EVIDENCE grading system

Applied and Clinical Research,
Department of Dental Hygiene,
Nebraska Center for Materials
and Nanoscience, University of
Nebraska Medical Center,
College of Dentistry, Lincoln, NE
68583-0740, USA

*Corresponding author. Tel: +1 402 472
5168, +1 402 890 2105 (mobile). E-mail:
cbarnes@unmc.edu*

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ABSTRACT

Nosocomial and ventilator associated pneumonias that plague critically ill, elderly and long-term care residents could be reduced with effective oral hygiene practices facilitated collaboratively between nurses and dental hygienists.

Background

Nosocomial pneumonias, specifically aspiration pneumonias and ventilator-associated pneumonias in the elderly and infirm have become a major health care issue. The provision of oral care in hospital and hospital-like facilities presents challenges that can prevent patients from receiving optimal oral care. One sequela can be aspiration pneumonia which ranks first in mortality and second in morbidity among all nosocomial infections. Since aspiration pneumonia is linked to the colonization of oral bacteria in dental plaque and biofilm, it is time to look for creative solutions to integrating the expertise of dental hygienists into health care teams in these institutional settings.

Methods

A comprehensive review of the literature was conducted regarding the etiology and prevalence of health care related pneumonias. Evidence describing the challenges and barriers that the nurses, nursing staff, and dental hygienists face in the provision of oral care in hospitals and long-term care facilities is provided. Intercolaborative solutions to providing optimal oral care in hospitals and long-term care facilities are suggested.

Conclusion

Dental hygienists have the expertise and practice experience to provide oral care in hospitals, long-term care and residential facilities. They can contribute to solving oral care challenges through intercollaboration with other health care team members. Yet, there are long-standing systemic barriers that must be addressed in order to provide this optimal care. Dental hygienists becoming better assimilated within the total health care team in hospital and residential facilities can positively impact the suffering, morbidity and mortality associated with aspiration pneumonias.

Key words: Dental hygiene, prevention, nosocomial infections, nursing home, critically ill aspiration pneumonia, ventilator associated pneumonia barriers to oral care

INTRODUCTION

There is an abundance of literature that suggests various associations between oral and systemic conditions.¹⁻⁹ As research evolves, the evidence grows stronger that oral flora are associated with systemic diseases, especially in states of chronic infection. Some associations between oropharyngeal colonization in chronic oral infections and systemic diseases are stronger than others. Oropharyngeal colonization and inflammation have been associated with cardiovascular disease, endocarditis, diabetes, obesity, prosthetic joint infections, fetal development, pulmonary disease, rheumatoid arthritis, osteoporosis, chronic obstructive pulmonary disease, and chronic kidney disease.¹⁻⁹

Concomitant with the association between oropharyngeal colonization and systemic diseases, there has been a burgeoning recognition among a variety of health care professions that oral hygiene plays a critical role in one of the most common and costly health outcomes, aspiration pneumonia.^{10–12} The attention is specifically on the elderly, chronically and critically ill patients in hospitals and long-term care facilities, particularly when dependent on ventilators. Research in this arena is being conducted internationally dental hygienists, dentists, nurses, physicians and speech pathologists.^{10–12} Aspiration pneumonia ranks first in mortality and second in morbidity among nosocomial infections, which broadly defined includes infections associated with the provision of health care.^{10–12} The enormity of morbidity, mortality and financial costs calls for an urgent response. The dental hygienist has appropriate expertise to provide efficacious solutions. They can provide the preventive oral care and therapeutic services as well as mentor nursing personnel who may be providing the oral care.^{10–33} This review will explore: (1) nosocomial pneumonias, specifically aspiration pneumonias, (2) the pathogenetic changes that occur in the oral flora of patients that are hospitalized or receive long-term care, (3) the types of patients predisposed to or who are at high-risk for aspiration pneumonias, (4) reasons that aspiration pneumonias are a major cause of morbidity and mortality to those who are vulnerable to this infection, (4) barriers to the provision of oral care for at-risk patients, and (5) solutions to address many of the morbidities and mortalities related to aspiration pneumonia, some of which can be provided by dental hygienists.

DEFINING NOSOCOMIAL INFECTIONS

'Nosocomial infection' is the term that traditionally has been used to describe new infections that occur within 24–72 hours of admission to a hospital, 3 days after discharge or 30 days after a surgical operation. A nosocomial infection is acquired in a hospital, and was not present or incubating at the time the patient was admitted to the health care facility. In some recent scientific literature the definition of 'nosocomial infections' has been expanded and is now inclusive of hospital settings, nursing homes (NH), outpatient delivery services such as day-surgery and dialysis centers, home parenteral therapy and additional sites other than acute-care facilities. The expanded definition of nosocomial infections is referred to as health care associated infections.³⁴ Nosocomial infections are caused by viral, bacterial, and fungal pathogens. The most common types of nosocomial infections occur in the bloodstream, lungs, surgical sites and the urinary bladder.

ASPIRATION PNEUMONIA AND ASPIRATION PNEUMONITIS

Aspiration pneumonia occurs with the micro-aspiration of oropharyngeal secretions into the trachea and lungs. The bacteria and other types of microorganisms infiltrate the lungs. If the host defenses are not successful at clearing the bacteria,

the result is a unilateral or bilateral lung infection (see **Figure 1**). Research indicates the right lower lobe of the lung is the most frequent site of the infection.³¹ Aspiration pneumonia is a leading cause of death among residents of nursing homes and for some types of hospitalized patients.^{32,33} Additionally, aspiration pneumonia is the most common reason for nursing home residents to be transferred to hospitals.³¹ The clinical symptoms of aspiration pneumonia, cough, fever, chest pain and dyspnea are often indistinguishable from other types of pneumonia.

Aspiration pneumonia differs from *aspiration pneumonitis* (Mendelson's Syndrome) which occurs when highly acidic gastric contents are aspirated into the lower respiratory tract. The gastric contents, which are usually sterile, create a chemical injury to the lung tissues which in turn causes an intense inflammatory reaction. By contrast, aspiration pneumonia is a true infection of the lower respiratory tract due to the oropharyngeal secretions that are colonized by pathogenic bacteria.^{32,33} In some cases aspirated gastric contents can cause aspiration pneumonia. Gastric contents can be contaminated with oropharyngeal bacteria and gastric bacteria, especially in patients who have been treated with acid-suppressing drugs. In the absence of certain strong gastric acids, bacteria can thrive that otherwise would not survive the acidic environment.

COMMUNITY-ACQUIRED PNEUMONIA AND NOSOCOMIAL-ACQUIRED PNEUMONIAS

Aspiration pneumonia can be a *community-acquired infection* or a *nosocomial infection*, also referred to as hospital acquired pneumonia (HAP), health care-associated pneumonia (HCAP) or nursing home acquired pneumonia (NHAP).^{28,34} Community-acquired pneumonia (CAP) develops in non-institutionalized people during the course of their daily lives. Both nosocomial acquired pneumonias (NAP) and CAP are commonly polymicrobial, however, the microbial etiology for each of the pneumonias is distinctly different.^{27,28,33,34} CAP is commonly caused by pathogens that reside in the upper respiratory airways such as: *Candida albicans*, *Chlamydia pneumoniae*, *Haemophilus influenzae*, *Legionella pneumophila*, *Moraxella catarrhalis*, *Streptococcus pneumoniae*, *Mycoplasma pneumoniae* and some anaerobic species.^{27,35–37} CAP most often presents as low-severity disease.³⁷

NAPs are associated with more severe disease, longer hospital stays, and higher mortality rates than CAPs. The overall mortality rate for CAP patients who are admitted to the hospital is 10%, while a mortality rate of 30% is associated with NAP, although this rate is not universally accepted.³⁸

ETIOLOGY OF ASPIRATION PNEUMONIA

Aspiration pneumonia is most often caused by bacteria that are not common to upper respiratory airways, which suggests that

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