Prevention of Hospital-Associated Pneumonia Using a Comprehensive Oral Hygiene Protocol

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Abstract

Health Care Associated Pneumonia Prevention Using a Comprehensive Oral Hygiene Protocol

Issue: An intervention project using a comprehensive oral hygiene protocol that included mechanical cleansing with an antiseptic agent led to a reduction in the rate of health care associated pneumonia (HCAP) in non-critical care, non-ventilated neurological and orthopedic patients.

HCAP is associated with high rates of mortality, longer hospital stays, and increased costs. A risk factor in the development of HCAP is the aspiration of bacteria or respiratory pathogens that colonize the oropharynx and upper airways. Preventive measures that include structured oral hygiene interventions may reduce oral bacterial colonization, and subsequently the risk of developing pneumonia. The CDC recommends the development and implementation of a comprehensive oral-hygiene program for patients in acute care-settings or patients in long-term care who are at risk for HCAP.

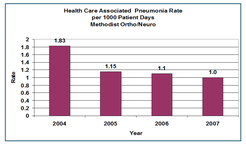
In our facility, the orthopedic and neurology unit (Ortho/Neuro), had the highest rate of hospital-acquired post-operative and medical pneumonias. The rate of HCAP per 1,000 patient days was 1.83 in 2004. This unit was chosen to trial a new oral cleansing kit and implement an evidence-based oral care protocol to reduce the incidence of HCAP.

Project: A new protocol of comprehensive oral care was initiated in August 2005 to reduce the rates of HCAP on the Ortho/Neuro Unit. A patient education sheet on HCAP and the oral care protocol were given to all Ortho/Neuro patients on admission. The comprehensive oral hygiene program included brushing teeth every 12 hours using a baking soda-saturated toothbrush. This was followed by using swabs with prepackaged cleanser in the mouth every 4 hours utilizing an oral care cleansing kit. The kit contained an antiplaque solution (cetylpyridinium chloride 0.05%), and a mouthwash with 1.5% hydrogen peroxide.

To maintain integrity of the mouth, an alcohol-free moisturizer for the lips and mouth was used every 4 hours. Additional pneumonia prevention strategies were implemented, including incentive spirometry, coughing and deep breathing, elevating the head of the bed, and early mobility. HCAP rates per 1000 patient days were measured and compared to all other areas in the hospital.

Results: Following an increased focus on the initiative of structured oral care in April of 2006, a significant reduction in HCAP rates per 1000 patient days on 5 South occurred, with a rate of zero from July 2006 through January 2007. A steady reduction in the rates of HCAP per 1000 patient days occurred from the pre-initiative baseline rate in 2004 through 2007 (1.83 in 2004; 1.15 in 2005; 1.1 in 2006; 1.0 in 2007). This represents a 46% reduction in the rate of HAP from 2004 to 2007.

Lessons Learned: The results indicate use of the comprehensive oral hygiene protocol which included the oral cleansing kit was effective in reducing the rates of HCAP. There is potentially significant cost savings if this protocol is implemented. Each case of HCAP costs between $15,000 to $65,000 and one 24 hour oral care kit is $16.80 (package of 6). With an average length of stay of 4 days, the total costs would be $67.20 to implement the structured oral care protocol. This intervention project demonstrates a comprehensive structured oral care protocol may significantly reduce HCAP in high-risk patient populations and deserves further study.



The numbers reported in the poster for the study have been updated by the authors and therefore are somewhat different from those reported in the initial abstract.

Introduction

Hospital-acquired pneumonia (HAP) is defined as pneumonia that develops in patients who are not ventilated but who develop a positive respiratory culture after 2 days of being hospitalized.[1] Healthcare-associated pneumonia (HCAP) is defined as a positive respiratory culture within 2 days of hospital admission in patients who were transferred from another facility, were receiving long-term dialysis, or had been hospitalized within 30 days.[1]

Morbidity and mortality are high with both HAP and HCAP. In a study of data from a large multicenter database, the mortality rate was 18.8% for HAP and 19.8% for HCAP.[1] The mean hospital length of stay increased by 15.2 ± 13.6 days with HAP and by 8.8 ± 7.8 days with HCAP.[1] The mean total hospital charges were $27,647 for patients with HCAP and $65,292 for patients with HAP.[1] For ventilator-associated pneumonia, the mortality rate was 29.3%, the mean length of stay was 23.0 ± 20.3 days, and the mean total hospital charges were $150,841.[1]

Aspiration of oropharyngeal secretions plays a central role in the development of pneumonia, particularly in patients with abnormalities in swallowing and upper-airway protective reflexes.[2] Aspiration of bacteria from oral biofilms (dental plaque) may initiate or facilitate the progression of pneumonia and other systemic infections.[3] Sumi et al[4] found that dental plaque from 64.5% of dependent elderly cases harbored potential pulmonary pathogens. Thus, dental plaque can serve as a reservoir for pathogens for aspiration pneumonia.[4]

Aggressive oral care reduces colonization by potentially pathogenic bacteria and is likely to reduce the risk of pneumonia.[2] In a placebo-controlled, randomized study of 417 nursing home patients, oral care reduced the rates of pneumonia, fever, and death from pneumonia.[5]

Oral care is recommended by the Centers for Disease Control and Prevention as part of a comprehensive approach to prevent HAP. Specifically, they recommend developing and implementing a comprehensive oral hygiene program of oropharyngeal cleaning and decontamination for patients in acute care settings or for residents of long-term care facilities.[6]

Purpose

In 2004, the orthopedic and neurology units of our facility had the highest rates of HAP (post-operative and medical pneumonias), i.e., 1.83 cases/1,000 patient days. We studied the efficacy of an oral hygiene protocol that implemented a new oral cleansing kit and an evidence-based oral-care protocol in reducing the incidence of HAP.

Methods

The new oral-care protocol was initiated in all non-critical care, non-ventilated neurologic and orthopedic patients on this 42 bed unit beginning in April 2006. A patient education sheet on HAP prevention and the oral-care protocol were given to all study patients at the time of admission. Representatives from Sage Products, Inc (Cary, IL), the Service Leader, and the unit Performance Improvement representative collaborated to train the staff on how to implement the protocol. The protocol was reinforced and outcomes were reviewed quarterly, and a Cerner documentation screen was created.

Oral-care protocol:

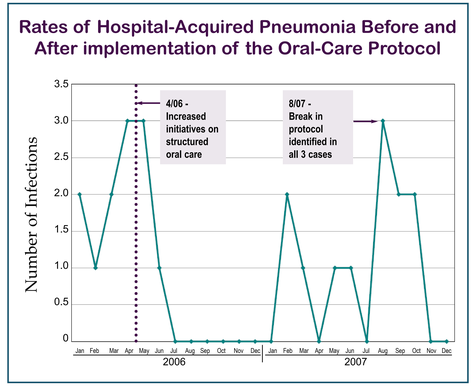
- Brush teeth every 12 hours with the sodium bicarbonate impregnated suction toothbrush from the oral-care kit which contains Anti-Plaque Solution to help dissolve mucous and biofilm.
- Cleanse oral cavity every 4 hours with foam suction swab and the prepackaged cleanser which contains an anti-septic oral rinse (cetylpyridinium chloride 0.05%) to reduce bacterial load in the oral cavity.
- Apply a mouth moisturizer to the lips and oral mucosa every 2 to 4 hours.

Additional pneumonia prevention strategies:

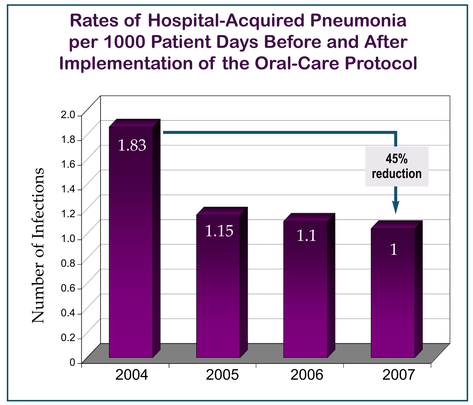
- Elevate the bed to at least 30 to 40° or as much as possible.
- Perform incentive spirometry in patients together with coughing and deep breathing.
- Encourage and assist patients to early mobility when possible (e.g., sit in a chair for meals; walk 100 feet 3 times daily).

Results

Shortly after implementation of the new oral-care protocol, HAP rates began to decrease: from 3 cases in April 2006 (the first month of the study) to 0 cases by July 2006.



The HAP rate per 1000 patient days decreased from 1.83 in 2004 to 1.0 in 2007 – a 45% reduction.



Discussion

These results indicate that the use of a comprehensive oral hygiene program can lead to reduced rates of HAP.

- The number of HAP infections had been higher in this patient population than in other areas in the hospital prior to implementation of the protocol.
- After implementation, the HAP rates decreased to a comparable level or less. Education of the patients about oral care provided them with the information necessary for them to better participate in their own care.

Although our study was not designed to determine cost savings, it is very likely that the small costs associated with prevention resulted in a reduction in the overall costs of care because of the reduction in the rate of HCAP.

Estimated Cost Savings

Each case of HCAP/HAP costs $27,000 to $65,000.[1]

Cost of the oral-care kits:

- Package of 6 cleansings (24-hour supply) = $16.80
- Average length of stay on this unit is 4 days, so the total cost of care for 4 days is $16.80 X 4 = $67.20

$67.20 for the patient length of stay for prevention compared with up to $65,000 per case of HAP!

References:

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