

# ANNIHILATING VENTILATOR-ASSOCIATED PNEUMONIA WITH A RESPIRATORY THERAPY EMPHASIS ON ORAL CARE

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## ABSTRACT

### BACKGROUND

Each case of ventilator-associated pneumonia (VAP) increases ventilator days, critical care and hospital lengths of stay, and results in additional facility costs of over \$40,000. An increase in the VAP rate at the Medical Center of McKinney led to formation of a Performance Improvement (PI) team to assess the impact of prevention interventions. The PI team, which included Respiratory Therapy, Nursing, and Infection Control, conducted a review of current literature regarding processes to decrease VAP risk and increase patient safety. Based on the latest evidence-based research, the team developed a plan that included awareness, education and a comprehensive oral care protocol.

### METHOD

The PI team implemented the plan in the first quarter of 2004, notifying Critical Care and Respiratory staff of the VAP rate and its impact on patient outcomes. Respiratory Therapy accepted responsibility for implementing oral care every two hours and documenting the process. The oral care protocol addressed oropharyngeal colonization, oral secretions management, and dental plaque formation through brushing, cleansing, suctioning and moisturizing. For further reinforcement of VAP prevention strategies, staff attended an additional off-site education seminar.

### RESULTS

Due to the protocol intervention, McKinney's annual VAP rate in 2003—8.2 per 1000 vent days—was reduced to 0 for 2004. McKinney avoided an estimated 11 cases of VAP, along with over \$440,000 in facility costs for treatment. The facility continues to maintain a VAP rate of zero to this date.

### CONCLUSIONS

This dramatic improvement in patient safety may be attributed to the implementation of heightened staff awareness, increased staff education regarding VAP, and compliance to a comprehensive oral care protocol. The sustained improvement of patient outcomes is credited to the Respiratory Therapy staff's diligence in making VAP prevention a priority.

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## INTRODUCTION

It is estimated that 1 in 10 hospitalized patients will acquire an infection after admission, which will result in a prolonged length of stay while incurring additional diagnostic and therapeutic interventions that add substantial economic costs.<sup>1</sup> “Ventilator-associated pneumonia (VAP) is the most common and lethal form of hospital-acquired pneumonia. It occurs in up to 28% of patients who need mechanical ventilation for more than 48 hours.”<sup>2</sup> Additional direct costs to a hospital can range from \$29,000 to more than \$57,000 for each case of VAP;<sup>3,4</sup> while prolonging time on mechanical ventilation and hospital stay by more than 9 days each.<sup>5</sup>

The CDC’s Guidelines for Preventing Health-Care--Associated Pneumonia, 2003, published in 2004, makes practice recommendations based on the strength of evidence available.<sup>6</sup> However, these guidelines were not available to us

during the second half of 2003, when our facility noted a sustained increase in the rate of VAP. We were prompted to form a multidisciplinary Process Improvement team to investigate care practices and potential interventions that could reverse this trend. The team—which included Respiratory Therapy, Nursing, and Infection Control—conducted a review of current literature. Based on the latest evidence-based research, the team developed a plan that included awareness, education and a comprehensive oral care protocol.

### Three VAP Risk Factors<sup>7,\*</sup>

- Bacterial colonization of the oropharyngeal area
- Aspiration of subglottic secretions<sup>1</sup>
- Colonization of dental plaque with respiratory pathogens

\* Among other risk factors. <sup>1</sup>Routine suctioning minimizes oral secretions which can migrate to the subglottic area.

## METHODS AND MATERIALS

Medical Center of McKinney is a full-service acute care hospital with over 200 patient beds and two campuses in McKinney, TX. Our ICU has 16 beds with an average daily census of 9.5.

We initiated the Process Improvement plan in December 2003 with a component to increase staff awareness of VAP and the number of patients it affected over the past year. We communicated the plan through staff meetings and posters.

In February 2004, Nursing and Respiratory staff attended an off-site educational seminar. The seminar covered epidemiology and etiology of VAP along with discussion of various prevention strategies. This included the rationale for oral care interventions and the risk factors they address.

Staff received additional education during implementation of the oral care protocol and product in-servicing for the 24-hour oral care kits they would be using (*Figure 1*). Special emphasis was made to stress effective communication between the ICU Nursing staff and Respiratory Therapists to work toward the common goal of reducing VAP.

The comprehensive oral care protocol (*Figure 2*) consists of q2-hour care to address the risk factors of oropharyngeal colonization through frequent cleansing and moisturizing of the oral cavity, management of oral secretions (that can be aspirated) through oral and deep oropharyngeal suctioning, and the removal of

bacteria-laden dental plaque through tooth brushing. Respiratory staff also took responsibility for documentation of oral care and monitoring of semi-recumbent positioning (HOB >30 degrees).

Infection Control monitored compliance to the protocol through visual and audited chart reviews and tracked VAP by using the CDC’s National Nosocomial Infections Surveillance (NNIS) System’s definitions for pneumonia.

FIGURE 2

NORTH CENTRAL MEDICAL CENTER		POLICY & PROCEDURE	
TITLE:	Oral Care Protocol for Ventilator Patients	ORIGINATION DATE: 1/04	PAGE: Page 1 of 2
		REVIEW // REVISION DATE(S): 8/30/2005	
APPROVED BY: Scott Donaldson M.D.		F&P NUMBER: 10.18	
APPROVED BY:		F&P REPLACED [Number]:	

#### POLICY:

This protocol will be used on all patients who are receiving ventilator therapy at Medical Center of McKinney.

#### PURPOSE:

To provide quality oral care to patients who are receiving ventilator therapy and decrease the opportunity for ventilator associated pneumonias.

#### PROCEDURE:

- Daily:** Change out the covered Yankauer, Suction Handle and Y Port. The Yankauer is used to Suction retained oral secretions.
1. Attach Y Port to suction canister, place 2 tubes of suction line to the ends of the Y Port. Attach the in-line suctioning line to one of the suctioning tubes.
  2. Place the end of suction handle directly into the remaining suction tubing.
  3. Attach covered yankauer directly into the suction handle.
  4. To use the covered yankauer, pull down the sheath cover and rest in bottom cuff. This will ensure the sheath cover does not ride up while suctioning.
  5. Turn on the suctioning power by moving power flow control knob ( on suction handle) to the on position. When finished, turn suctioning power off ( on suction handle) and pull sheath cover up over yankauer.

#### Q12Hours: Oral Care

1. Use suction toothbrush to mechanically cleanse the teeth.
2. Burst perox-a-mint tube directly in pouch and mix solution with the suction toothbrush.
3. Take out suction toothbrush and attach to the suction handle, (from covered yankauer kit).
4. Turn suction power on, and in a circular motion gently brush teeth for 2-3 minutes.
5. When finished, turn suctioning power off, pop off suction toothbrush and throw away. Make sure to replace covered yankauer onto the suction handle.

#### Q2hours and PRN

1. Using yankauer, suction existing oral secretions.
2. Cleanse oral cavity using Green Toothette Swab and Perox-A-Mint solution (Sage Oral Care 6602 kit). Nursing personnel will provide oral care above and beyond Q2 hr intervals. Respiratory Therapists will document on respiratory ventilator flow sheets Q2 hours.
3. Using Yankauer, suction any residual oral secretions.
4. When finished, turn suctioning power off and pull sheath cover over the yankauer.
5. Each 6602 kit contains oral care supplies for a 24 hour period including Q12 hr regimen for toothbrush procedure and general Q2 hour oral care.
6. Nursing personnel will provide oral care at their discretion above and beyond the routine Q2 hour regimen documented by respiratory therapy using Sage oral care product #6550.

FIGURE 1



Q-Care® Oral  
Cleansing &  
Suctioning  
q2 System  
from  
Toothette®  
Oral Care



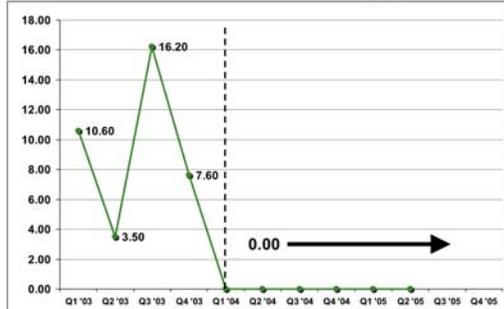
## RESULTS

Implementation of the Process Improvement plan has resulted in a dramatic impact on the rate of VAP in our ICU. The annual rate of VAP for 2003 was 8.2 per 1000 vent days. This was reduced to 0 in 2004 and still remains 0 through 3 quarters in 2005. Based on 2003 numbers, 11 cases of VAP were avoided in 2004. This resulted in a financial benefit to the facility of \$319,000 to \$627,000 for that year alone. Monitoring of documentation to the oral care protocol reveals a >95% rate of compliance.

### VAP RATE

McKinney Medical Center  
McKinney, TX

VAP Rate per 1,000 vent days



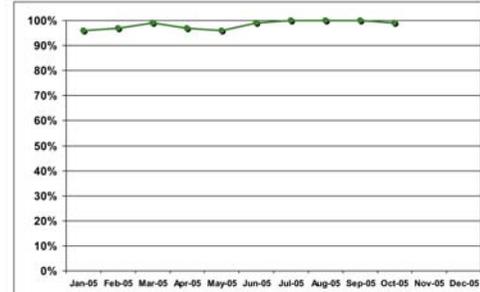
Q-Care® Oral Cleansing & Suctioning System implemented February, 2004

11/15/05

### ORAL CARE COMPLIANCE

McKinney Medical Center  
McKinney, TX

Oral Care done according to protocol  
for ventilator patients



Q-Care® Oral Cleansing & Suctioning System implemented February, 2004

11/15/05

## CONCLUSION

The success of our protocol is demonstrated by the fact that we have had no ventilator-associated pneumonias for 21 consecutive months. This dramatic improvement in patient safety may be attributed to the implementation of heightened staff awareness, increased staff education regarding VAP, and compliance to a comprehensive oral care protocol. The sustained improvement of patient outcomes is credited to the Respiratory Therapy staff's diligence in making VAP prevention a priority.

Our success with the "annihilation of ventilator-associated pneumonias" is a direct result of our Respiratory Therapists and ICU Nursing staff's enthusiasm and belief that q2-hour oral care is important to provide quality patient care. Our hospital's Medical Director and Administration supported this intervention. Communication and interdependence between RT and Nursing staff fostered a culture conducive to creating and sustaining a new standard of care.

The education and support by the product manufacturer was instrumental in creating a heightened awareness of the importance of oral care. The product and its packaging facilitated compliance to the protocol.



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## ACKNOWLEDGEMENTS

Our success is a direct result of the dedication of our Respiratory Therapists and ICU Nursing staff to provide the ultimate in quality patient care. Well done! We would also like to acknowledge the support of our Hospital Administrative team and Medical Director. Thank you Sage Products Inc. for creating the story board necessary to display our success and diligent effort.