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## The Importance of Oral Suction Hygiene in the Prevention of Ventilator Associated Pneumonia

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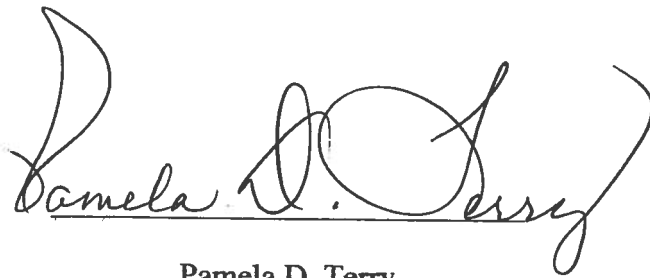
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A handwritten signature in black ink, appearing to read "Pamela D. Terry". The signature is written in a cursive style with a large, stylized initial "P" and a large, stylized "T". The signature is written over a horizontal line.

Pamela D. Terry

## University Honors Program Research Project

## Approval Page

Student Name: Pamela D. Terry  
Department: Nursing  
College: Nursing  
Degree: Bachelor's of Science in Nursing  
Project Advisor: Dr. Pamela V. O'Neal

Full title of project as it should appear in Graduation Program and transcript:

The Importance of Oral Suction Hygiene in the Prevention of Ventilator Associated Pneumonia

## Abstract:

**Background**

Ventilator associated pneumonia (VAP) remains one of the leading nosocomial illnesses to affect mechanically ventilated patients (reference). Pathogenic organisms can enter the oral cavity and migrate to the lower airways contributing to VAP development when health care providers do not implement manufacturer recommended cleaning and proper storage of oral suction devices.

**Methods**

In a descriptive study, observational data was obtained from the intensive care units of a southeast regional hospital. Specifically, the placement and storage of the oral suction device in the patient room were observed. The sample size was 106 patient room observations in the intensive care settings. University institutional review board and the hospital institutional review committee approval were obtained.

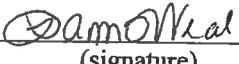
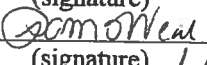

**Results**

Of the total oral suction devices, 39 percent were visible and in their original protective packaging, 52 percent were visible, but not in protective packaging, and 9 percent were not visible. Since only one episode of active suctioning (by a respiratory therapist) was observed it is unknown to the investigators whether the devices are routinely cleaned before or after use, or in the case of the unseen devices, if new devices are being requisitioned for each suctioning procedure.

**Discussion**

Despite current knowledge of bacterial infections and their lifespan on fomite surfaces, published guidelines that would safeguard the patient's portal of entry are vague and incomplete. The chain of infection could be broken before it ever reaches our patients – if the device used to suction is cleaned before and after each use, and placed in proper storage. Clinicians should be encouraged to champion the standard of hygiene that would best protect the patient and prevent the transmission of disease.

Approved by:

Project Advisor:  Date: 4/28/10  
(signature)  
Department Chair:  Date: 4/28/10  
(signature)  
University Honors Program Director:  Date: 4-30-10  
(signature)

The Importance of Oral Suction Device Hygiene in the  
Prevention of Ventilator Associated Pneumonia

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Pamela V. O'Neal PhD, RN

UAHuntsville College of Nursing Honors Program

Spring 2010

## Table of Contents

<b>I. Approval Page.....</b>	<b>1</b>
<b>I. Abstract.....</b>	<b>4</b>
<b>II. Introduction .....</b>	<b>5</b>
<b>III. Literature Review .....</b>	<b>5</b>
<b>IV. Methods .....</b>	<b>8</b>
<b>V. Results .....</b>	<b>9</b>
<b>VI. Limitations .....</b>	<b>10</b>
<b>VII. Implications for Practice .....</b>	<b>10</b>
<b>VIII. Acknowledgements .....</b>	<b>11</b>
<b>IX. References .....</b>	<b>12</b>
<b>X. Appendix A: Internal Review Board, UAHuntsville .....</b>	<b>14</b>
<b>XI. Appendix B: Internal Review Committee, Huntsville Hospital .....</b>	<b>15</b>

## **Abstract**

### **Background**

Ventilator associated pneumonia (VAP) remains one of the leading nosocomial illnesses to affect mechanically ventilated patients (Scott, 2008). Pathogenic organisms can enter the oral cavity and migrate to the lower airways contributing to VAP development when health care providers do not implement manufacturer recommended cleaning and proper storage of oral suction devices.

### **Methods**

In a descriptive study, observational data was obtained from the intensive care units of a southeast regional hospital. Specifically, the placement and storage of the oral suction device in the patient room were observed. The sample size was 106 patient room observations in the intensive care settings. University institutional review board and the hospital institutional review committee approval were obtained.

### **Results**

Of the total oral suction devices, 39 percent were visible and in their original protective packaging, 52 percent were visible, but not in protective packaging, and 9 percent were not visible. Since only one episode of active suctioning (by a respiratory therapist) was observed it is unknown to the investigators whether the devices are routinely cleaned before or after use, or in the case of the unseen devices, if new devices are being requisitioned for each suctioning procedure.

### **Discussion**

Despite current knowledge of bacterial infections and their lifespan on fomite surfaces, published guidelines that would safeguard the patient's portal of entry are vague and incomplete. The chain of infection could be broken before it ever reaches our patients – if the device used to suction is cleaned before and after each use, and placed in proper storage. Clinicians should be encouraged to champion the standard of hygiene that would best protect the patient and prevent the transmission of disease.

## The Importance of Oral Suction Device Hygiene in the Prevention of Ventilator Associated Pneumonia

### **Introduction**

Registered nurses (RNs) have an obligation to follow current evidence based practice to provide their clients with the most effective care plan to produce the most optimal result. This is especially true in the intensive care setting where the client may not be physically able to participate in their own care. The intensive care nurses' attention is, and should be, focused on matters of immediate life and death; yet, they are also responsible for routine oral care. The most simple, basic precautions that may seem elementary to an outside observer are often overlooked by healthcare professionals. One area where protocol is lacking is in the cleaning and proper storage of oral suction devices. It is well documented that gram negative bacilli are a primary cause of VAP, and these organisms have been discovered on hospital surfaces and equipment– and may be viable for up to three months. This study sought to identify the placement and storage of oral suction devices because nurses can make a dynamic change with the execution of a seemingly minor act of hygiene – saving both lives and dollars. However, given that research has shown that there is a definite lag between development and implementation of said protocols, the most simple intervention may still be years away from being realized.

### **Literature Review**

Brown and Willms, (2005) report that 80% of the oral suction devices collected in their convenience sample of three intensive care units were colonized with pathogenic organisms. The devices were not in any type of storage container – they were found on

various surfaces including bed linens, on the floor, and on ventilator surfaces. They contend that oral suction devices should be stored in designated holders. However, there was no mention of the need for cleaning the device before storing it. Bacteria from the patient could be on the device even when it is stored in a proper, specific container, and these bacteria could be reintroduced into the patient with each subsequent reuse. Therefore, a simple hygiene protocol before storage and again before reuse could be a vital element in the prevention of VAP.

The Centers for Disease Control and Prevention (CDC, 2003) have published guidelines for the prevention of ventilator associated or hospital acquired pneumonia (HAP). These imperatives include “Clean or replace equipment between use on different patients”. Cleaning procedures are not identified and storage is not mentioned. There is no indication that reintroduction of bacteria from the patient’s own, dedicated oral suction device has even been considered. Many of these devices are sold as “disposable”, yet they are routinely reused for at least a 24 hour period – or until they appear to be soiled. These oral suction devices should never be shared between patients.

In a summary of current evidence to compare the effect of oral care on mechanically ventilated patients, Halm and Armola (2009) concluded that tooth brushing and chlorhexidine based preparations may effectively reduce ventilator associated pneumonia. They describe the endotracheal tube as a conduit for colonization, however, no mention of oral suction device cleaning and storage was made.

The importance of oral care was examined by Feider, Mitchell, and Bridges (2010). The focus here was on the facility’s plan for oral care versus actual frequency of oral care. The oral care described included tooth brush, mouth swabs, chlorhexidine rinse or

gel, and/or assessment of the oral cavity. No mention of maintenance of the actual oral suction device was noted. The conclusions drawn were that even in facilities with a policy focused on planned care, actual care fell below the set standard.

In a narrative summary of current best practice recommendations regarding tracheal suctioning of adults with an artificial airway, McKillop (2004) developed an information sheet containing the top 11 pertinent issues. This was subsequently distributed to 105 critical care nurses in three hospitals in New Zealand and Australia. Using a pre and post observational survey, the nurses were assessed on implementation of the items presented immediately after receiving the information and one year later. McKillop notes that there is possibly an 8-15 year gap from dissemination of research findings to incorporation of these findings into practice. It was believed that using the information sheet to summarize the new information would have a positive correlation with implementation of the evidence into practice, and to a mild degree this hypothesis was supported. The “teaching” status of these hospitals was not divulged. However, it is likely that new evidence-based practice techniques are more readily accepted at such institutions. Similar studies comparing teaching and non-teaching hospitals in the United States would be valuable. It is also possible that institutional delays of procedural changes are preventing nurses from implementing changes that would directly improve patient outcomes. It is anticipated that the development of new guidelines for oral suction device cleaning and storage will not be readily accepted into practice. Thus, the need for the development of guidelines is urgent since practice changes evolve rather slowly over time.

Cason, Tyner, Saunders, and Broome (2005) administered a 29 question survey regarding care of patients who were mechanically ventilated to 1200 critical care nurses. This was a cross-sectional study of nurses who attended a continuing educational conference or seminar in various locations across the United States. Their area of interest was the correlation of current practice with Center of Disease Control (CDC) guidelines. They determined that nurses who focused on prevention of bacterial colonization of the oral cavity by following hospital protocols emphasizing oral care were more likely to be in compliance with the CDC recommendations. They also noted that perhaps since these nurses were attending educational seminars on the subject, they were more inclined to know and use evidence based practice as opposed to nurses who attended seminars on other subjects. No protocols relating to the cleaning and proper storage of the oral suction device were mentioned.

## **Methods**

A descriptive study was conducted in a not-for-profit, southeastern teaching hospital with 881 licensed acute care beds. University institutional review board and hospital review committee approval were obtained. At the inception of the study, ICU nurses were informed that the investigators would be making observations in all mechanically ventilated adult patient rooms. The ICU nurses were invited to join the rounds, and encouraged to ask any questions they may have had. Initially, the research team met with resistance – the nurses were very protective of their patients, and although only equipment-related data was being collected, some indicated they felt they were being spied upon. Five of the adult intensive care units of the hospital were toured during each

visit – including two Cardiac Care Units, a Medical Intensive Care Unit, a Neurological Intensive Care Unit, and the Surgical Trauma Intensive Care Unit. The Cardiovascular Intensive Care Unit data was not collected due to the short term intubation period of the immediately post surgery patient. The following information was obtained: location of oral suction device in each patient's room and storage characteristics of oral suction device (was the device in packaging or out in the open). No personal patient demographics were obtained. This study was conducted over three months to observe healthcare personnel behavior over time related to placement of oral suction device and storage.

## **Results**

Eight visits were conducted from July 2009 through November 2009, with a total of 106 individual records collected. Fifty-eight oral suction devices were observed on patient bed linens or under the patient's pillows; thirty-eight oral suction devices were discovered lying on shelves above the bed, hanging from shelves, on bedside tables or on window ledges. No oral suction device could be readily located in ten of the patient's rooms. Devices were stored in their original, protective packaging 38 percent of the time and in no packaging 53 percent of the time. The investigators saw no evidence of rinsing or cleansing of the devices. The investigators were told by some of the personnel that devices were discarded when they appeared to be soiled.

**Limitations**

This study was limited to one organization, therefore results cannot be generalized. However, there was no variation in practice between the units. No observations were made pertaining to oral suction device cleaning practices. However, in several conversations with either intensive care RNs or licensed respiratory therapists who performed suctioning on a regular basis, the investigators were told that no oral suction device cleaning had occurred.

**Implications for Practice**

Oral suction devices are marketed as disposable products; perhaps it is thought to not be cost effective to procure a new device for each suctioning procedure. Suctioning, as well as oral care, is to be done on a regular schedule (ideally every four hours), and additionally when deemed necessary. It would be most difficult to know how many devices one patient might need during their ventilated status. One would need to have only a short discussion with a microbiologist to learn that there are relatively few organisms which may be observed with the naked eye. The practice of discarding a device only when it is visibly soiled could be likened to discarding one's tooth brush after months of use without ever having rinsed it. Manufacturers recommend use of the disposable oral suction device for a 24 hour period only; they also advise that the device be rinsed with sterile saline after each use. Devices are now being packaged with self-contained sheath covers, with attachable bedside holders as an additional option. The sheath cover may keep the device from being contaminated by the environment, but if no cleaning occurs, it merely covers the bacteria, allowing it to multiply in its' preferred

moist environment. More research is needed to determine the efficacy of various cleaning techniques upon the oral suction device. Testing to determine the extent of contamination on devices which are returned to their original packaging for storage or left open to air has been conducted. For additional testing purposes, devices could be inoculated with organisms, then rinsed with tap water, normal saline or sterile water and swabbed for contamination detection. Certainly it is the goal of every conscientious nurse to have a positive outcome for each patient, and not to contribute to any disease process. It is imperative that simple solutions not be overlooked, but implemented as standard protocol to potentially save lives. The disparity between recommendation and practice may only be an educational issue. Those who procure the supplies used by nurses may be completely unaware of the need for instruction related to the use of the supplies.

**Acknowledgements**

This researcher wishes to express deepest gratitude to Pamela V. O'Neal Ph.D., RN for her guidance and untiring assistance in all aspects of the research. Special thanks to Harry Delugach, Ph.D., Mrs. Betty Cole, UAHuntsville College of Nursing, UAHuntsville Internal Review Board and the Huntsville Hospital Review Committee.

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<http://ajcc.aacnjournals.org/cgi/reprint/11/2/141>

**Appendix A**

Nicholaos Jones  
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Alex M. Witcher & Pam D. Terry  
c/o Dr. Pamela O'Neal  
College of Nursing  
University of Alabama in Huntsville  
Huntsville, AL 35899

July 2, 2009

Dear Mr. Witcher and Ms. Terry,

As chair of the IRB Human Subjects Committee, I have reviewed your proposal, *Comparison to Determine if Suction Tubing Length Compromises Suction Strength*, and have found it meets the necessary criteria for exemption from review according to 45 CFR 46. I have approved this proposal, and you may commence your research. Please note that this approval is good for one year from the date on this letter. If data collection continues past this period, a renewal application must be filed with the IRB.

Please contact me if you have any questions.

Sincerely,

Dr. Nicholaos Jones  
Chair, UHSC

OFFICE OF THE VICE PRESIDENT FOR RESEARCH  
Von Braun Research Hall M-17 Huntsville, AL 35899

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Appendix B



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July 10, 2009

Mr. Alex M. Witcher  
Ms. Pam D. Terry  
UAH School of Nursing  
University of Alabama-Huntsville  
202 Nursing Building  
Huntsville, AL 35899

RE: Request for Institutional Review Committee Exemption of Study -  
Comparison to Determine if Suction Tubing Length Compromises Suction

Dear Mr. Witcher and Ms. Terry:

Thank you for forwarding the application for Institutional Review Committee exemption to me for your proposed nursing study. Dr. John Cox, Chair has reviewed your information and agreed that this study does qualify for exemption.

If you have any questions or I can be of further service, please feel free to call me at 265-6990.

Sincerely,

A handwritten signature in cursive script that reads 'Allison E. Greene'.

Allison E. Greene, Division Assistant/  
Institutional Review Committee Coordinator

cc: Karol Jones, Chief Nursing Officer