# Diagnosing Ventilator-associated Pneumonia in Burn Patients: Endotracheal Aspirates Versus Bronchoalveolar Lavage

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## Abstract

A diagnosis of Ventilator-associated pneumonia (VAP) can be difficult in the thermal burn patient and microbiological data are crucial. We compared the results of three culture methods in a population of burn patients to determine if the methods, though differing in cost and complexity, would provide similar results and be predictive of VAP. The results were surprising.

## Introduction

Ventilator-associated pneumonia (VAP) is associated with increased mortality, ventilator days, intensive care unit days and length of stay, especially in the thermal burn patient.

While no "gold standard" diagnosis for VAP exists, criteria typically include clinical suspicion, radiography and microbiological testing. The purpose of this study was to correlate results of endotracheal tube swabs (ETT), endotracheal aspirates (TA) and broncheoalveolar lavage (BAL) in burn patients with suspected VAP.

The goal of this study is to determine if TA sampling is a viable alternative to BAL in the diagnosis of VAP in burn patients.


*Figure 1: Illustration and comparison of the various collection methods*

## Methods

This was a non-interventional prospective study of 42 adult burn patients at the Arizona Burn Center with suspected VAP. Respiratory specimens via ETT, TA, and BAL were collected and cultured. Basic demographics, clinical signs and symptoms and culture results were collected and descriptive statistics were performed.

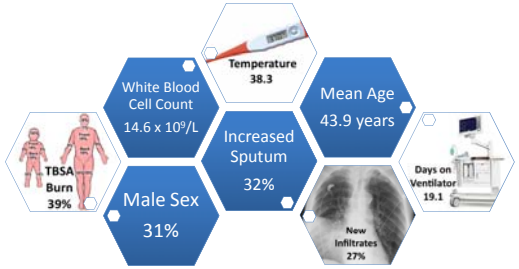


*Figure 2: Demographic and Clinical Characteristics of Patients*

## Results

Adjusted odds ratios were calculated for select variables and the presence of ventilator associated pneumonia. The only statistically significant variable was white blood cell count. For every 1 increase in this value, the risk of VAP increased by 1.2 fold.

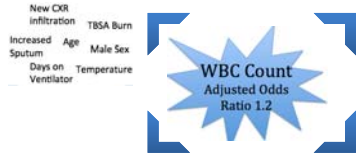


*Figure 3: Adjusted odds ratios WBC Count is the only significant value.*

Correlations were done between TA, BAL and ETT. TA and BAL correlated 87% of the time while TA and ETT correlated 49% of the time. The correlation between ETT and BAL was 40%. These results were statistically significant. Sensitivities and specificities were also calculated.

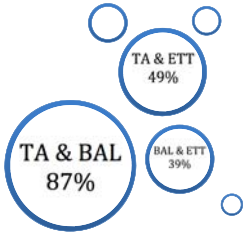


*Figure 4: Correlations between the TA, BAL, and ETT cultures*

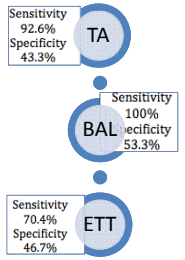


*Figure 5:* Sensitivities and Specificities of BAL, TA, and ETT in the diagnosis of VAP

## Discussion and Conclusions

What does this mean for burn patients with suspected VAP? It means that while a quantitative culture is the current recommendation, a qualitative culture of the endotracheal aspirate may suffice. This could be performed more promptly, frequently, easily, and cost effectively and therefore should not be discounted as a reliable method of sampling.

Further studies could explore stratifying the relative results of each of the culture methods by organism. One future study method could include the use of screening endotracheal aspirate cultures on all ventilated burn patients and subsequent performance of BAL on those patients who develop clinical symptoms or positive cultures

## Acknowledgements

I wish to thank my mentors Drs. Melissa Pressman and Kevin Foster, the staff at the burn center, and Paul Kang.