

Effectiveness of bacterial disinfectants on surfaces of mechanical ventilators ar...

[Health & Medicine](#), [Alcoholism](#)



\n[[toc title="Table of Contents"](#)]\n

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1. [Introduction of the research project](#) \n \t
2. [Methods](#) \n \t
3. [Data Analysis](#) \n \t
4. [Results](#) \n \t
5. [Conclusion](#) \n \t
6. [Works Cited](#) \n

\n[/toc]\n \n

Introduction of the research project

The purpose of this article was to assess the rate at which bacteria contaminate the surface of ventilator equipment and other equipment being used by the hospital for the patients care. The implications of this study are many, as there are many microorganisms that can grown on environmental surfaces and causes severe bacterial infections in the patient. The hypothesis is that the use of 75% alcohol will decrease the contamination rate of mechanical ventilator systems.

Methods

The study was done at Mackay Memorial Hospital in Taipei City, which has a 15- bed respiratory care center. All patients included in this study were either intubated by the use of an endotracheal tube or a tracheostomy tube in the center. All patients were stable during the time of the study but were otherwise unable to be removed from respiratory support. The equipment

was disinfected using 0.5% sodium hypochlorite and pasteurization respectively when the patient either died or was able to be removed from the ventilator system. During use the systems were changed once every two weeks.

All parts of the mechanical ventilators were swabbed within the two-week time frame. The swab itself was a sterile bacoon swab that was moistened with 1 mL sterile distilled water. Nine ventilators were selected at random to test the effectiveness of the use of 75% alcohol. The study participants were divided into three groups, the control which received no alcohol, the 1st experimental group that received a 75% alcohol aerosol, and the 2nd experimental group that received a 75% alcohol cleaning with tissue drying. Samples were cultured on different agar plates for total bacteria, *S. Aureus*, and *P. Aeruginosa*.

Data Analysis

The level of significance was set to $p < 0.05$. The study used a chi square test to establish the association between the detection rates and the sampling points/ sampling time points/ the use of 75% alcohol. The Wilcoxon rank sum test was also used and compared the bacterial concentrations at different time points and study groups.

Results

S. Aureus was found on mechanical ventilators at a detection rate of 47.1-64.7%. Breathing circuits tested positive for *S. Aureus* at a rate of 46.7-86.7% and for *P. Aeruginosa* at 6.7-13.3%. Bedside equipment tested positive for *S. Aureus* at a rate of 33.3-60% and *P. Aeruginosa* at 6.7-13.3%. Some

samples tested positive for *S. Aureus* and other bacteria following initial disinfection with 0.5% sodium hypochlorite. The use of 75% aerosol alcohol did not decrease the total bacterial concentration on the material surfaces. *S. Aureus* on the ventilator system was significantly decreased following the use of 75% alcohol aerosol.

Conclusion

S. Aureus was significantly decreased following the use of 75% aerosol alcohol on the ventilator system but not on water trapped surfaces. Theories on the reasoning for this is that the healthcare professional did not use gloves, did not properly wash hands, or the water traps touched the ground. *S. Aureus* contamination was higher in the group where the material was dried using tissue. To counteract this phenomenon it is suggested to use sterile gauze instead of tissue paper to dry the surfaces. 75% alcohol was found to not reduce the rate of *P. Aeruginosa* concentrations. This study concluded that ventilator surfaces should be disinfected every 8 hours since initial findings suggested that the total bacterial count on these surfaces were increased 8 hours after initial disinfection. Future studies need to focus on other methods of disinfection; and as always healthcare professionals should take care when washing their hands to reduce the spread of bacteria.

Works Cited

Sui, Y., Wan, G., Chen, Y., Ku, H., Li, L. Liu, C., & Mau, H. (2012) Effectiveness of Bacterial Disinfectants on Surfaces of Mechanical Ventilators. *Respiratory Care*. 57(2): 250-256. DOI: 10. 4187/respcare. 01180