

Bacterial transmission through gown fabrics when they are wet

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Surgical gowns are widely used in operating theaters to minimize the risk of transmitting healthcare acquired infections. Bacterial diseases are spread through both airborne and bloodborne pathways. Surgical gowns can reduce this bacterial transfer by creating a physical barrier between the infection source and a healthy individual. Bacteria have varying characteristics that influence their potential to transmit through gown fabrics. Some of these characteristics include shape and size. In the operating theater and other healthcare environments, blood or other liquids may spill on the gown and wet the gown fabric. Research has shown that the barrier effectiveness of gown fabrics can be altered when this occurs. The purpose of this research is to determine what happens to the barrier effectiveness of gown fabrics after they become wet by various liquids similar to those commonly found in operating theaters.

Variables in this research include the fabric construction of the gowns, bacterial species and liquids. Six gowns that are commercially available in the market, were used here. Fabric characteristics such as weight, thickness and pore size were determined using standard test methods. Five liquids with various surface tensions ranging from 43 to 74dynes/cm, were used as wetting agents to wet the gown fabrics. In this study two bacteria known as primary contributors to healthcare acquired infections were selected as the challenge microorganisms. *Staphylococcus aureus* is classified as gram positive and is round, and *Escherichia coli* is gram negative and is rod-shaped.

In this research, a petri dish containing a lawn of bacteria was prepared, a fabric specimen cut from the gown was placed on the top of bacteria, then known amount of

liquid was applied on the top of fabrics' surface. A second petri dish (collector plate) was placed on the top of wetted fabric, and allowed to sit undisturbed for 90 minutes. At that time the collector plate was removed and incubated at 37°C for 24 hours. The colony forming units on the collector plate were counted. The total CFU's was used to determine bacterial transmission. Data was analyzed statistically using Analysis of Variance (ANOVA).

The results showed that the fabric construction of gown, the surface tension of liquids and the bacterial species significantly influenced the bacterial transmission. Surface tension of liquid was shown to be the most critical variable as liquids with lower surface tensions resulted in higher bacterial transmission through the gown fabrics. The *staphylococcus aureus* transmitted more than *Escherichia coli* as it was smaller in size and round in shape.