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The Relationship of Fabric Properties and Bacterial Filtration Efficiency for Selected Surgical Face Masks

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ABSTRACT

Surgical face masks are an important component of surgical apparel. The masks are expected to perform as barriers and provide increased protection to the patients and health care workers. In this study, the Bacterial Filtration Efficiency (BFE) of six commercially available surgical face masks was determined for two microorganisms. Fabric characteristics (weight, thickness, pore size, and resistance to synthetic blood strike through) thought to influence the barrier effectiveness were measured and the relationship between these characteristics and BFE was examined. Two challenge microorganisms, Staphylococcus aureus and Escherichia coli were evaluated in this study. For five of the six masks evaluated, the BFE against the challenge microorganism S. aureus was higher than when the challenge microorganism was E. coli. The mask with the lowest mean pore size and lowest maximum pore size had the highest BFE for both microorganisms evaluated, indicating that a relationship exists between pore size and BFE.

Keywords: surgical face masks, bacterial filtration efficiency, S. aureus, E. coli

Introduction:

Bacterial and viral diseases are spread through both airborne and blood borne pathways in the operating theater. Surgical apparel can minimize the transmission of disease. The transfer of microorganisms can be reduced because the protective surgical apparel creates a physical barrier between the infection source and the healthy individual.[1] A medical device intended to be worn by operating room personnel during surgical procedures to protect both the surgical patients and operating room personnel from transfer of microorganisms, body fluids and particulate material is identified as "Surgical Apparel" in 21 CFR, Part 878.4040. The OSHA Occupational Exposure to Blood Borne Pathogens: Final Rule (1991) mandates the principles of universal precautions, mandates performance levels, and allows employers to specify what personal protective equipment is required and when it must be used.[2, 3] Surgical face masks are an important component of surgical apparel. The masks are expected to perform as barriers and provide increased protection to the patients and health care workers. Initially, the primary purpose of the facemask was to protect the patient from being contaminated by bacteria or viral species exhaled or