The Liquid Barrier and Thermal Comfort Properties of Reusable and Disposable Surgical Gowns

(수술복의 방수성과 열적 쾌적성)

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ABSTRACT

The liquid barrier and thermal comfort properties of reusable and disposable surgical gowns were measured in this study. The five gowns included the AsepTM regular, reusable; CompelTM reusable, fabric reinforced; Gore-TexR reusable, membrane reinforced; EvolutionR disposable, fabric reinforced; and EvolutionR Specialty disposable, film reinforced. The liquid and viral barrier properties of fabrics taken from the front, sleeve, and seams of the surgical gowns were measured. In addition, the reusable gowns were evaluated after being laundered, dried, and steam sterilized with and without bleach at seven laundry levels: 1, 20, 40, 50, 60, 70, 80 times. The barrier tests included the Impact Penetration Test (AATCC 42-1985), Synthetic Blood Resistance Test (ASTM F 23.40.01, Draft), Viral Resistance Test (ASTM F 23.40.02, Draft), and Elbow LeanTest.

The insulation value and evaporative resistance of the fabrics and gowns were measured on a sweating hot plate and a thermal manikin in an environmental chamber. Eighteen subjects with surgical experience performed eight psychomotor tasks for 2 hours in a simulated operating room environment while wearing each of the gowns. They recorded their thermal comfort and clothing comfort sensations every 30 minutes. The subjects and clothing were weighed before and after the experiment to determine the amount of unevaporated sweat retained in theclothing.

The Gore-TexR and EvolutionR Specialty gown fabrics passed all of the liquid barrier tests with synthetic blood and the viral challenge. Only the Gore-TexR gown sleeve seams passed all tests. The other gowns passed only the Impact Penetration (splash) test. The reusable Gore-TexR gown maintained its barrier properties after 70 laundering and sterilizations with bleach and after 80 processings without bleach.

The insulation values of the gowns were similar, but the EvolutionR Specialty had a significantly higher evaporative resistance than the others. There were no differences in the thermal sensations of the subjects due to gown type, but there were differences in clothing comfort sensations. Overall, the AsepTM gown was the most comfortable and the EvolutionR Specialty was the least comfortable. However, the Gore-TexR gown provided both protection from bloodborne pathogens and acceptable comfort.