

Use of Environmental Air Quality Indicators to Assess the Types of Surgical Headgear Typically Used in a Dynamic Operating Room Environment

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INTRODUCTION: The effectiveness of different types of operating room headcovers to prevent airborne contamination has been called into question, with some parties feeling that a bouffant style hat is superior because it is able to better contain the hair and cover the ears. The data to support this theory is sparse. We therefore hypothesized that there would be no difference between bouffant style hats and skull caps in terms of airborne contamination metrics.

METHODS: Disposable bouffant and skull cap hats, as well as newly laundered cloth skull caps were tested at two different operating rooms in two academic medical centers. A patientless mock surgical procedure was utilized in a dynamic operating room environment where all standard OR practices were undertaken. Airborne particulate matter was sampled with a particle counter, surface air samplers were used to actively acquire airborne microbes, and settle plates were placed around the sterile field to assess passive microbial shed. Hat fabric was tested for permeability and pore size and was imaged by electron microscopy. Data were compared by Mann-Whitney test and $p < 0.05$ was significant.

RESULTS: No significant differences were observed between disposable bouffant and disposable skull caps with regard to total airborne particle or microbial contamination. However, when compared to disposable skull caps, disposable bouffant hats had significantly higher microbial shed at the sterile field as measured by passive settle plate analysis ($p < 0.05$). When compared to reusable cloth skull caps, disposable bouffants yielded significantly higher 0.5 μ m and 5.0 μ m particles in the room, no difference in total room microbes, but significantly higher passive microbial shed at the sterile field. Microscopic analysis and permeability testing of the fabric determined that bouffant hats had widely varying pore sizes and were significantly more permeable ($p < 0.05$) than either disposable or cloth skull caps.

CONCLUSION: Disposable bouffant hats had greater permeability and greater microbial shed as assessed by passive microbial analysis compared to disposable skull caps. When compared to cloth skull caps, disposable bouffants had greater permeability, greater particulate contamination, and greater passive microbial shed. These data suggest that disposable bouffant hats are not superior to skull caps for reducing particles and microbial load in a dynamic operating room environment.