



Influence of staff number and internal constellation on surgical site infection in an operating room



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ABSTRACT

Prediction of bacteria-carrying particle (BCP) dispersion and particle distribution released from staff members in an operating room (OR) is very important for creating and sustaining a safe indoor environment. Postoperative wound infections cause significant morbidity and mortality, and contribute to increased hospitalization time. Increasing the number of personnel within the OR disrupts the ventilation airflow pattern and causes enhanced contamination risk in the area of an open wound. Whether the amount of staff within the OR influences the BCP distribution in the surgical zone has rarely been investigated. This study was conducted to explore the influence of the number of personnel in the OR on the airflow field and the BCP distribution. This was performed by applying a numerical calculation to map the airflow field and Lagrangian particle tracking (LPT) for the BCP phase. The results are reported both for active sampling and passive monitoring approaches. Not surprisingly, a growing trend in the BCP concentration (cfu/m^3) was observed as the amount of staff in the OR increased. Passive sampling shows unpredictable results due to the sedimentation rate, especially for small particles ($5\text{--}10\ \mu\text{m}$). Risk factors for surgical site infections (SSIs) must be well understood to develop more effective prevention programs.

