

ABSTRACT

Effect of forced-air warming on the performance of theatre laminar flow ventilation

Anaesthesia

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Summary:

“We conclude that forced-air warming generates convection current activity in the vicinity of the surgical site. The clinical concern is that these currents may disrupt ventilation airflows intended to clear airborne contaminants from the surgical site.”

Methods: The researchers investigated whether the floor-to-ceiling temperatures around a draped manikin in a laminar-flow theatre differed when using three types of warming devices: a forced-air warming blanket (Bair Hugger®), an over-body conductive blanket (HotDog®), and an underbody resistive mattress (Inditherm®).

The foot-end of the drape was intentionally raised to create an air channel that directed the forced-air exhaust out of the ventilation field—allowing the heat radiating through the drapes to be studied.

Results:

“With forced-air warming, mean (SD) temperatures were significantly elevated over the surgical site vs those measured with the conductive blanket (+2.73 (0.7) °C; $p < 0.001$).”

Forced-air warming technologies release significantly higher levels of excess heat than conductive warming technologies. “This finding is of concern because temperature elevations are the direct result of hot air-pockets moving upwards and against the downward laminar airflow currents...any temperature elevations are the result of convection current activity.”

“The mass-flow of forced-air exhaust appears to play a critical role in the degree of ventilation disruption,” but convection current activity is still generated directly above the surgical site even when the mass flow of exhaust is vented out the foot end of the drapes.

“Conductive warming technologies have little or no impact on ventilation airflows.”

This study was conducted by Anesthesiologists at Royal Sussex County Hospital, UK. Mark Albrecht, an employee of Augustine Biomedical + Design (ABD), was a graduate student in statistics at the University of Minnesota at the time of the study and contributed to the statistical analysis and manuscript preparation. ABD also provided the temperature mapping equipment. No other financial support was provided.