Forced-air Warming and Ultra-clean Ventilation Do Not Mix

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ABSTRACT

Orthopedic surgeons investigated the capacity of patient warming devices to disrupt the ultra-clean airflow system, comparing the effects of Bair Hugger® forced-air warming and HotDog® conductive fabric warming on operating theatre ventilation during simulated hip replacement and lumbar spinal procedures using a mannequin as a patient. Infection data covering 2.5 years and 1437 patients were reviewed to determine whether joint infection rates were associated with the patient warming device used.

> **Summary: Waste heat from Bair Hugger forced-air warming was associated with a 3.8 times higher rate of joint sepsis after total joint arthroplasty compared to air-free HotDog warming.**
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> **Deep joint infection rates dropped 74% after switching from Bair Hugger to HotDog patient warming.**

Excess heat from forced-air warming escaped near the floor and generated convection currents that mobilized floor air, causing it to rise between the surgeon's body and the operating table, transporting contaminated floor-level air upwards and into the surgical site. Conductive fabric warming had no such effect.

A significant increase in deep joint infection, as demonstrated by an elevated infection odds ratio (3.8, $p = 0.028$), was identified during a period when forced-air warming was used compared to a period when conductive fabric warming was used.

The risks of developing deep infections were significantly greater for patients treated with forced-air (3.1%) versus conductive fabric warming (0.8%).

> **Conclusion: "Air-free warming is, therefore, recommended over forced-air warming for orthopedic procedures."**