air-free
PATIENT WARMING

Waste Heat Causes Contamination

With air-free HotDog® Patient Warming, heat is efficiently directed at the patient—no waste heat.

In contrast, the waste heat from forced-air warming (FAW) is proven to be a vector for contaminating the surgical site. The diagram below shows tributes to surgical site contamination.

Video evidence (available online) and peer-reviewed published research of these unintended consequences are highlighted below.

1 Waste heat rises from under drapes

McGovern, et al, JBJSBr, Nov 2011

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

"Excess heat from (FAW) resulted in [hot air convection currents] that transported floor-level air upwards and into the surgical site. In contrast, conductive fabric warming did these convection currents."

"Air-free warming, therefore, is recommended over (FAW) for orthopedic procedures."

Legg, A.J., et al, JBJSBr, Feb 2012

General Contamination

Dasari, et al, Anaesthesia, Mar 2012

Elghobashi, S.; et al. Int J Numer Method Biomed Eng. May 2018

Moretti, B.; et al. J Hosp Infect 2009

Scherrer, M.; et al. Min Invasive Thermal Allied Tech, Nov 2003

For a comprehensive summary of the re-search see hotdogwarming.com

2 Exhaust air travels over anesthesia drape

Belani, et al, A&A, Aug 2013

"The direct mass-flow exhaust from forced-air warming generated hot-air convection currents that mobilized [non-sterile] air over the anesthesia drape and into the surgical site."

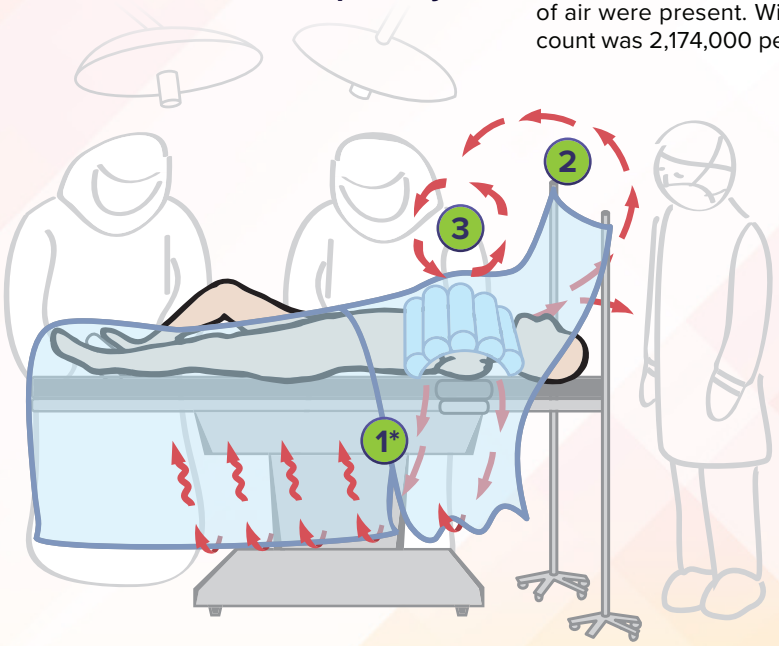
3 Excess radiant heat creates vortex

Legg & Hamer, Bone and Joint J, Mar 2013

The waste heat from forced-air warming (FAW) blankets radiated through the surgical drape to form tornado-like vortices of rapidly spinning air near the surgical site. The vortices sucked contaminated air from the operating room floor and deposited it over the surgical wound.

2,000 times more contaminant particles were found in the air over the wound with FAW than with air-free Hotdog conductive warming. With HotDog, only 1,000 particles per m^3 of air were present. With FAW, the particle count was 2,174,000 per m^3.

Heat always rises. Convection currents form in multiple ways.



*Waste heat takes the path of least resistance. Waste heat rising under the drapes is far more prevalent with lower body and underbody blankets.

FAW Waste Heat: The Missing Link in the Chain of Infection

Chain of Infection

Reservoir

Most of the bacteria in the OR are shed from the skin of surgical staff.

Portal of Exit

Microorganisms leave the reservoirs often by simple shedding, "space suit" exhaust, or rectal and vaginal shedding[1]. They settle near the floor.

Mode of Transmission (FAW)

The Missing Link.
Waste heat mobilizes contaminants from the floor into the sterile field in multiple ways (see studies highlighted on pg 1)[2].

Portal of Entry

The surgical wound. An increase of only 10 airborne bacteria per cubic meter doubles the risk of orthopedic implant infections[3].

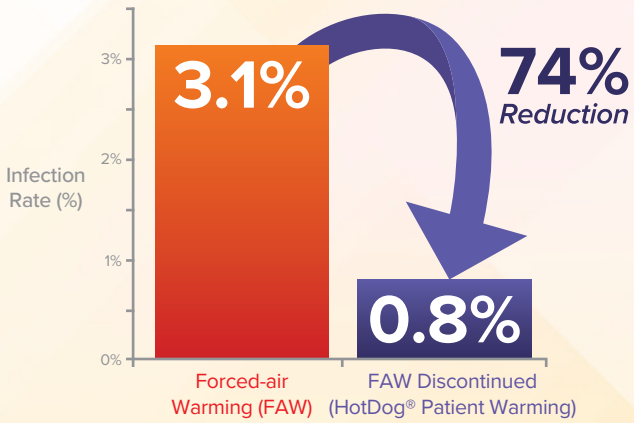
Susceptible Host

Orthopedic implant patients are at risk for infection from airborne contaminants. A single airborne germ can cause a deep infection of a joint implant[4]. These germs protect themselves from antibodies and antibiotics with a biofilm coating, eventually becoming a catastrophic deep joint infection.

Infectious Agent

A microbial organism with the ability to cause disease. Prevalent in hospitals.

Forced-air Warming Discontinued: Joint infections Reduced 74%



Joint Sepsis Rates for Hip and Knee Replacement Cases with Forced-air Warming (FAW) and After Discontinuing FAW[5]

1. Lidwell, OM et al. Infection and sepsis after operations for total hip or knee replacement: influence of ultraclean air, prophylactic antibiotics and other factors. J. Hyg (camb.) 1984;93:505.

2. All studies summarized at hotdogwarming.com/research

3. Darouiche, RO, et al; Association of Airborne Microorganisms in the Operating Room with Implant Infections: A Randomized Controlled Trial. Infect Control Hosp Epedimiol. 2017 Ja;38(1):3-10.

4. Lidwell OM et al. Bacteria isolated from deep joint sepsis afer operation for total hip or knee replacement and the sources of the infections with Staphylococcus aureus. J Hosp Infect 1983;4:19-29

5. McGovern P.D., Reed M.R., et al, Forced-air warming and ultra-clean ventilation do not mix. J Bone Joint Surg Br. 2011 Nov;93(11): 1537-44.

Augustine Surgical Inc.
Making Surgery Safer

www.hotdogwarming.com

Patents: hotdogwarming.com/patents
Rx Only
M121EN Rev E 2/23

6581 City West Parkway
Eden Prairie, MN 55344
952-746-1720 or 888-439-2767
email: cs@augsurg.com