

# Aggressive warming during surgery does not reduce major complications

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Patients kept at a body temperature of 37 C during major surgery had no fewer cardiac complications than patients kept at 35.5 C, according to

data presented at the American College of Cardiology's 71<sup>st</sup> Annual Scientific Session. There were also no differences in the number of infections or required blood transfusions in patients kept at cooler body temperatures.

Body [temperature](#) generally decreases during [surgery](#), largely because anesthetic medications interfere with the body's processes for regulating temperature. While practices vary around the world, nursing staff in Western countries typically use forced-air heaters to keep patients warm during surgery, with a target temperature of 36 C, or 96.8 F. This trial, one of the largest to date, sought to determine whether warming patients even more—to 37 C, or 98.6 F—would reduce the risk of [cardiac complications](#), which are a leading cause of death in the first 30 days after [major surgery](#).

Results showed no significant differences between groups for the trial's primary endpoint, a composite of troponin elevation due to ischemia (an indicator of heart injury), non-fatal cardiac arrest or death from any cause within 30 days after surgery. Researchers also reported no differences for any of the trial's secondary endpoints.

"This trial tells us that there is no benefit to aggressively warming patients to 37 C during surgery. It is simply unnecessary, and it doesn't improve any substantive outcomes," said Daniel I. Sessler, MD, Michael Cudahy professor and chair of the Department of Outcomes Research at Cleveland Clinic and the trial's lead author. "Also, the results show that 36 C should not be considered the threshold for defining mild hypothermia since there was no harm at 35.5 C."

The researchers enrolled 5,050 patients who had surgery at 13 medical centers, mostly in China. Participants had various major noncardiac surgical procedures, with a minimum duration of two hours and an average duration of four hours. Half of the patients were randomly

assigned to receive routine care, with a target body temperature of 35.5 C, while half received aggressive warming, with a target body temperature of 37 C.

For patients assigned to routine care, nursing staff put a warming cover in position but did not activate it until the patient's body temperature decreased to less than 35.5 C, resulting in an average group body temperature of 35.6 C. With the more aggressive warming protocol, nurses covered patients with a heated blanket for 30 minutes before surgery and then used two forced-air heaters to keep patients warmed to a mean of 37.1 C during surgery.

In addition to seeing no benefit in terms of the composite primary endpoint, the trial reported no significant differences between groups in terms of serious wound infections, length of hospitalization, hospital re-admissions or the need for blood transfusions. The investigators were surprised that rates of wound infections and transfusions were similar to previous studies, which suggested that both were more common in patients maintained at lower body temperatures.

Nearly all patients were enrolled in China, Sessler said, but the results should be generalizable to patients and health care settings in other countries.

"This study shows that it is reasonable to keep patients warm, but we saw no evidence whatsoever that it makes a difference if they're just above or just below 36 C," Sessler said. "Surgical patients should still be warmed, but there's no need to be super-aggressive about the warming."

The study did not assess less serious or non-medical outcomes, such as patient comfort or shivering. Sessler said that [patients](#) maintained at a lower body temperature may shiver or feel cold after surgery, but both are temporary and unlikely to have a meaningful health impact.

This study was simultaneously published online in *The Lancet* at the time of presentation.

**More information:** Daniel I Sessler et al, Aggressive intraoperative warming versus routine thermal management during non-cardiac surgery (PROTECT): a multicentre, parallel group, superiority trial, *The Lancet* (2022). [DOI: 10.1016/S0140-6736\(22\)00560-8](https://doi.org/10.1016/S0140-6736(22)00560-8)

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