Clinical evidence of prewarming patients.
Normothermia from the start: Clinical Evidence.
Modern perioperative thermal management aims at the prevention of hypothermia during the whole perioperative process to protect the patient from the adverse outcomes associated with hypothermia.

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Bräuer, A.; Bauer, M.; Modern Perioperative Thermal Management; Hospital Healthcare Europe 2014

Normothermia from the start: Clinical Evidence
Prewarming to Prevent Unplanned Hypothermia during General Anaesthesia.

Prewarmed vs. non-prewarmed in 68 elective spinal surgery patients.

Study Details.
This study of 68 elective spinal surgery patients compared prewarming vs. no prewarming. It indicates that prewarming with forced-air warming can result in a lower occurrence of unintended perioperative hypothermia, and can reduce the decline in core temperature after the induction of general anaesthesia.

Conclusion.
Indicates prewarming with a forced-air warming gown can:
• Result in a lower occurrence of unintended perioperative hypothermia.\(^5\)
• Reduce the decline in core temperature after the induction of general anaesthesia.\(^5\)

Duration of Prewarming and Postoperative Temperatures.

Effects of prewarming duration on perioperative hypothermia and post-operative shivering.

**Conclusion.**

- Prewarming utilising forced-air warming methods is effective at preventing hypothermia perioperatively and shivering postoperatively.²
- Approximately 70% of patients who received passive insulation (no prewarming) experienced hypothermia.²
- Short durations of prewarming at 10 or 20 minutes before anaesthesia induction generally prevents hypothermia.²
Impact of Prewarming during Colorectal Surgery.

Intraoperative warming vs. preoperative/intraoperative warming in 141 colorectal surgery patients.
Yilmaz M, Popwich D, Halverson A, Mullaghy E, McCarthy R.

Study Details.
This study of 141 patients undergoing colorectal surgery indicates that normothermia in PACU patients is achieved more effectively by prewarming versus warming a patient intraoperatively. Additionally, the study finds prewarmed patients had a propensity toward fewer infections and spent less time in the hospital.

Conclusion.
Normothermia in PACU patients is achieved more effectively by prewarming combined with intraoperative warming versus only using intraoperative warming.\(^3\)

Prewarmed patients had a propensity toward fewer infections and spent less time in the hospital.\(^3\)

Surgical Site Infection Rates.

Project targeting the reduction of SSIs in total hip and knee arthroplasty patients.\textsuperscript{4}

Study Details.
A recent project undertaken by a clinician targeting the reduction of SSIs in patients undergoing total hip and knee arthroplasty. A checklist was created in the facility which included, among other things, warming patients for one half hour before surgery and during surgery using a forced-air warming gown. Implementation and adherence to the checklist which included warming patients, significantly reduced the number of SSIs on THA/TKA patients.\textsuperscript{4}

Conclusion.
A half-hour of warming before surgery and warming during surgery using a forced-air warming gown. Additional components including CHG cloth baths 2x prior to surgery, pre-op nasal antiseptic, antibiotic infusion, and team participation in checklist review at start of surgical instrumentation.

Effects of Prewarming Following Anaesthesia Induction.

**Actively prewarmed vs. passively prewarmed patients.**
Camus Y, Delva E, Sessler DI, Lienhart A.

**Study Details.**
This randomised, prospective study of 16 laparoscopic cholecystectomy patients indicates that 60 minutes of prewarming with forced-air warming can lessen a patient’s core temperature drop after anaesthesia induction, and reduce redistribution temperature drop. It also indicates that prewarming is beneficial during shorter duration procedures.⁴

**Conclusion.**
- 60 minutes of prewarming with forced-air warming can lessen a patient’s core temperature drop after anaesthesia induction, and reduce redistribution temperature drop.⁶
- Prewarming is beneficial during shorter duration procedures.⁶

Prevention of Intraoperative Hypothermia with Prewarming.

**Review article on prewarming to prevent intraoperative hypothermia.**

**Conclusion.**
Studies show that prewarming before the induction of anaesthesia for at least 30 minutes and up to one hour can:

- **Raise a patient’s mean body temperature.**

- **Prevent or significantly reduce redistribution temperature drop.**

- **Help prevent hypothermia and its potential complications.**
Effects of Prewarming and Intraoperative Warming.

Prospective, randomised trial of 30 patients undergoing elective abdominal surgery.
Vanni SM, Braz JR, Modolo NS, Amorim RB, Rodrigues GR.

Study Details.
This prospective, randomised, blinded study on 30 patients undergoing elective abdominal surgery indicates that combining prewarming with forced-air warming before the induction of anaesthesia followed by intraoperative warming with forced-air warming prevented patients from experiencing hypothermia in surgeries of at least two hours in length.

Conclusion.
Combining prewarming with forced-air warming before the induction of anaesthesia followed by intraoperative warming with forced-air warming prevented patients from experiencing hypothermia in surgeries of at least two hours in length.

Prewarming + Intraop Warming:
Maintain the warmth already gained while the patient was prewarmed by monitoring temps and adjusting the warming unit in the OR accordingly.

Intraop Warming Only:
To “re-warm” following temperature afterdrop requires time and may require maximum operating temperature of warming device.

Effect of Prewarming on Regional Anaesthesia.

Study evaluated 7 patients receiving no prewarming vs. prewarming with forced-air warming prior to epidural anaesthesia.


Study Details.
This study compared the results of no prewarming vs. prewarming of patients prior to receiving epidural anaesthesia.
This study found that a decrease in core temperature or a result of redistribution temperature drop induced by epidural anaesthesia can be prevented by prewarming.
Prewarming is beneficial during procedures of shorter duration.

Conclusion.
• Hypothermia as a result of redistribution temperature drop occurs during regional anaesthesia.9
• A decrease in temperature can be prevented by prewarming.9

Perioperative warming with the 3M™ Bair Paws™ system results in cost savings\textsuperscript{10}


**Study Details.**
This RCT of 94 patients compared the rates of hypothermia (<36°C), patient well-being and the costs of warming for two different groups.\textsuperscript{10} The standard warming group utilised cotton blankets in pre-op and 3M™ Bair Hugger™ forced-air warming blankets from anaesthesia induction through the end of surgery. The extended warming group utilised the 3M™ Bair Paws™ system for prewarming, intraoperative warming and PACU recovery until patient discharge.

**Conclusion.**
The rate of hypothermia was reduced by 48% and intraoperative core temperature drop was minimised with the extended warming group.\textsuperscript{10} In addition, patients in the extended warming group had decreased anxiety levels and apprehension with increased patient comfort.\textsuperscript{10}

Extended warming with the Bair Paws system resulted in an estimated cost savings of $84 per patient versus standard warming processes in this study.\textsuperscript{10}
Prewarming: Temperatures and Length of Time.

Effects of prewarming on RTD on 7 healthy male volunteers.

Study Details.
This study of 7 healthy male volunteers indicates that 30 minutes of forced-air warming before induction of anaesthesia, i.e. prewarming, can increase the temperature of the periphery by an amount greater than the amount of heat redistributed from the core during Phase I of anaesthesia. This can prevent core temperature drop that ordinarily follows anesthetic-induced vasodilation.

This study indicates that 30 minutes of forced-air prewarming can prevent core temperature drop.

Conclusion.
Indicates 30 minutes of prewarming with forced-air before anaesthesia can:
- Increase the temperature of the periphery by an amount greater than the amount of heat redistributed from the core during Phase I of anaesthesia
- Prevent core temperature drop

Summary

Prewarming Works.
Prewarming can prevent or reduce redistribution temperature drop (RTD)\textsuperscript{1,7,9}

Providing more warmth to the Core.
Prewarming + intraoperative warming can help patients achieve a higher core temperature in PACU\textsuperscript{2,3,5,6}

Flexibility of Prewaming.
Prewarming is beneficial in procedures of shorter duration\textsuperscript{2,6}

A positive effect on patients.
Prewarming can positively affect patient comfort and satisfaction\textsuperscript{10,11,12,13,14}
References

14. Ember E. Benson, MN, RN, Diana E. McMillan, PhD, RN, and Bill Ong, MD, FRCPC. AJN May 2012 ▼ Vol. 112, No. 5

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