NORMOTHERMIA

THE WHY, HOW AND WHEN QUESTIONS IMPACTING POST OP INFECTIONS

JUSTINE WHEATLEY
Southern Cross Gillies and Auckland Surgical Hospitals

Webber Training 20 Anniversary

Hosted by Jane Barnett
jane@webbertraining.com

www.webbertraining.com **August 18, 2021**

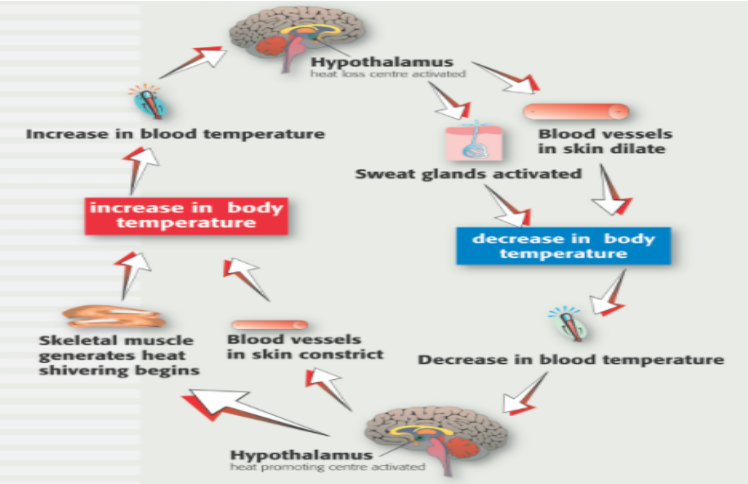
OBJECTIVES

At the conclusion of this teleclass, the participant will be able to understand:

- **Why normothermia is important**
- **How to maintain normothermia in a surgical setting**
- **When is the best time to instigate warming and temperature monitoring for the best impact on post op infections**

2

THERMOREGULATION



From: https://graphiceducation.com.au/product/body-temperature-regulation/

3

DEFINITIONS

Normothermia – normal core body temperature kept within the range of 36.8 –37.7 ° C[1]

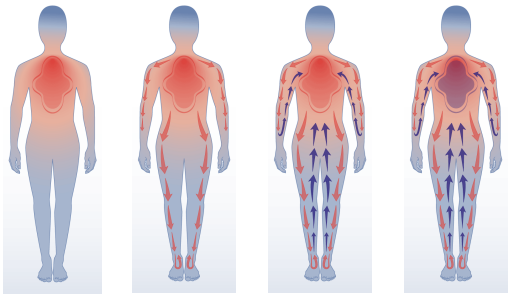
Temperature gradient - 2-4°C between the core and periphery

Hypothermia - temperature below 36 ° C

4

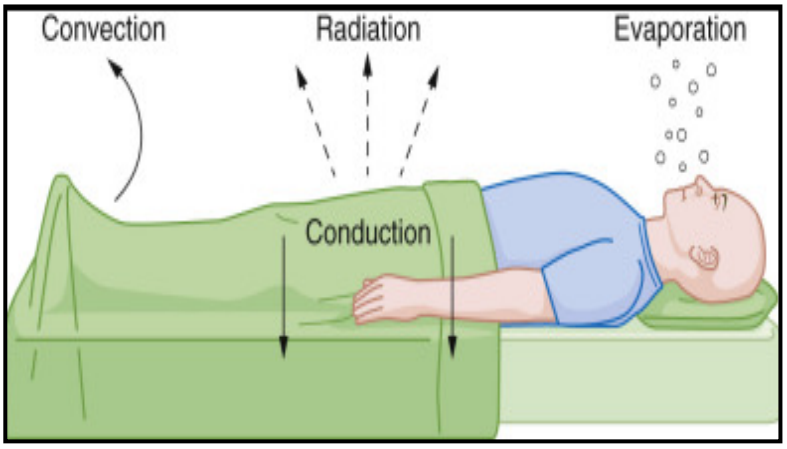
REDISTRIBUTION HYPOTHERMIA

core-to-peripheral redistribution of body heat following the induction of anaesthesia[2]



5

HOW HEAT TRANSFERS



From:Thermoregulation: Normal physiology, anesthetic effects, and perioperative considerations by Zaza, K. J., & Hopf, H. W. (2019).

6

OTHER CAUSES OF HYPOTHERMIA

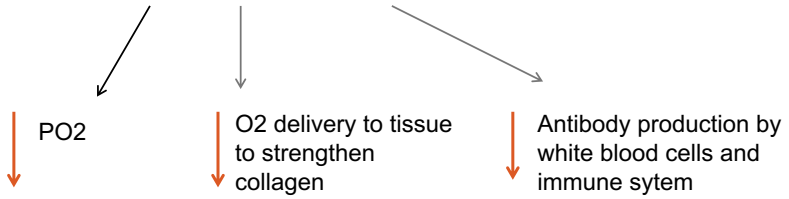
- Exposed cavity
- Cold OR temperatures
- Length of surgery
- infusion of cold fluids and blood

7

WHY NORMOTHERMIA IS IMPORTANT

Adverse effects of mild hyperthermia in surgical patients include increase incidence of:

- Morbid cardiac outcomes
- Blood loss
- Allogenic transfusions
- **Surgical site infections**



8

GUIDELINES FOR TEMPERATURE MONITORING

Healthcare organisations around the world have published recommendations or guidelines emphasising the importance of perioperative temperature management

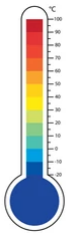
- Australian Commission on Safety and Quality in Healthcare
- Guidelines for Perioperative Evaluation of the Brazilian Society of Cardiology
- Canadian Patient Safety Institute
- The German Society of Anaesthesiology and Intensive Care Medicine, Robert Koch Institute
- Spanish Ministry of Science and Innovation
- Swedish Association of Local Authorities and Regions
- National Institute for Health and Clinical Excellence, Scottish Patient Safety Programme
- Clinical Guideline for Nonpharmalogic Prevention of Perioperative Accidental Hypothermia
- Anaesthesia Guidelines to Prevent Unwanted Perioperative Hypothermia
- American Association of Nurse Anaesthetists, American Society of Anaesthesiologists, American Society of PeriAnaesthesia Nurses, Association of periOperative Registered Nurses, Association of Surgical Technologists, Centres for Disease Control and Prevention, Centres for Medicare & Medicaid Services, Institute for Healthcare Improvement, The Joint Commission

9

TEMPERATURE MONITORING DEVICES

Before/After Surgery

- Tympanic
- Skin (infrared)
- Oral
- Temporal artery
- Zero-heat-flux
- Axillary

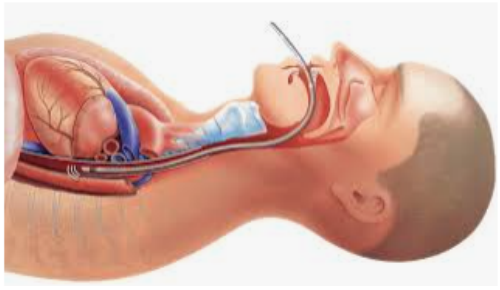


During Surgery

- Esophageal
- Pulmonary artery
- Nasopharyngeal
- Bladder
- Rectal
- Zero-heat-flux

10

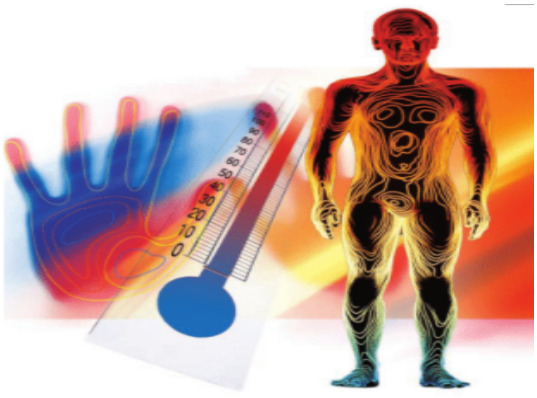
TEMPERATURE REVIEW



11

MAINTAINING NORMOTHERMIA

Passive Warming and Active Warming

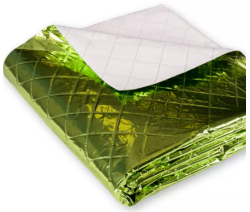


12

PASSIVE WARMING

Interventions to promote heat retention

- Cotton blankets
- Reflective blankets
- Environmental heating



13

ACTIVE WARMING

- **Water mattress** – thermostatically controlled gel based mattress that warms patient through conduction
- **Circulating water garment –** heat pump circulates warm water through a patient worn garment
- **Resistive heating**– conductive polymer fibre sheet that produces heat and warms the patient through conduction
- **Heated gel mattress** - thermostatically controlled gel based mattress that warms patient through conduction
- **Exothermic pads** – releases warmth through exothermic heat released when pads are exposed to air

14

ACTIVE WARMING

Forced air warming – air is sucked in from the surroundings and warmed using electric coils. The blower circulates the warm air through a blanket that warms the patient through convection

15

PRE WARMING

Active warming before surgery ‘banks’ heat to combat redistribution hypothermia

By 3M as part of an advertisement

16

REVIEW YOUR NORMOTHERMIA POLICY

EXAMPLE

Data Collection Tool	
1. Participant Code	
2. Preop Temperature	36.8 Celsius Thermofocus Method
3. Last Intraoperative Temperature	35.9 Celsius nasopharyngeal Method
4. First PACU Temperature	36 .2 Celsius Thermofocus Method
4. Was Prewarming Utilized	____ Yes x No
5. Number of minutes intraop the patient was < 36° Celsius (Cold Time Minutes)	60 minutes < 36° Celsius
6. Duration of Case (OR Time)	120 minutes
7. Were other warming measures utilized intraop?	Yes Fluid Warmer No Upper Body Blanket Yes Lower Body Blanket

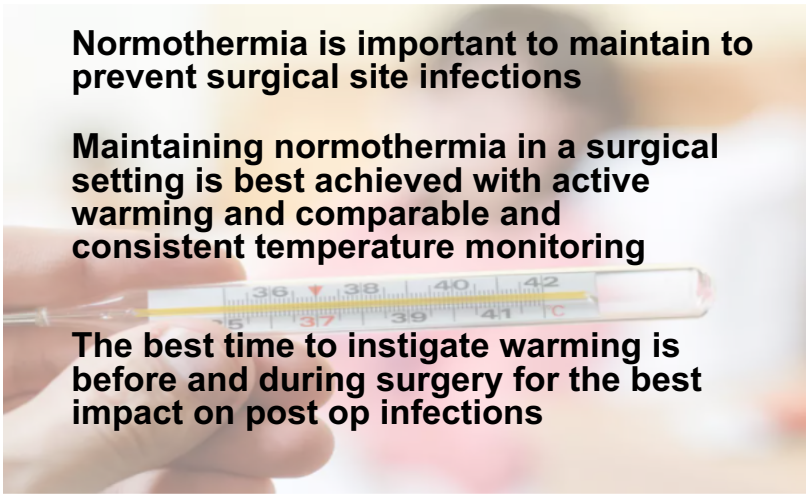
Taken between the eyebrows

Was the forced air warming blanket kept on to be used in PACU – was the temperature communicated to the team?

Taken over the carotid (not the same as baseline temperature)

17

NORMOTHERMIA SUMMARY



18

REFERENCES

Abreu, M. (2011). New concepts in perioperative normothermia: from monitoring to management. Anesthesiology News Special Edition.

Ackermann, W., Fan, Q., Parekh, A. J., Stoicea, N., Ryan, J., & Bergese, S. D. (2018). Forced-air warming and resistive heating devices. Updated perspectives on safety and surgical site infections. *Frontiers in surgery*, *5*, 64.

Alderson, P., Campbell, G., Smith, A. F., Warttig, S., Nicholson, A., & Lewis, S. R. (2014). Thermal insulation for preventing inadvertent perioperative hypothermia. *Cochrane Database of Systematic Reviews*, (6).

Andrzejowski, J., Hoyle, J., Eapen, G., & Turnbull, D. (2008). Effect of prewarming on post-induction core temperature and the incidence of inadvertent perioperative hypothermia in patients undergoing general anaesthesia. *British journal of anaesthesia*, *101*(5), 627-631.

Bindu, B., Bindra, A., & Rath, G. (2017). Temperature management under general anesthesia: Compulsion or option. *Journal of anaesthesiology, clinical pharmacology*, *33*(3), 306–316.

Bitner, J., Hilde, L., Hall, K., & Duvendack, T. (2007). A team approach to the prevention of unplanned postoperative hypothermia. AORN journal, 85(5), 921-929.

Frank SM, Fleisher LA, Breslow MJ, et al. Perioperative maintenance of normothermia reduces the incidence of morbid cardiac events. A randomized clinical trial. JAMA. 1997;277(14): 1127-1134.

Global Guidelines for the Prevention of Surgical Site Infection. Geneva: World Health Organization; 2018. Web Appendix 14, Summary of a systematic review on maintaining normal body temperature (normothermia)

Hart, S. R., Bordes, B., Hart, J., Corsino, D., & Harmon, D. (2011). Unintended perioperative hypothermia. Ochsner journal, 11(3), 259-270.

Knaepel, A. (2012). Inadvertent perioperative hypothermia: a literature review. Journal of perioperative practice, 22(3), 86-90.

Kurz A. Physiology of thermoregulation. Best Pract Res Clin Anaesthesiol. 2008;22(4):627-644.

Kurz A, Sessler DI, Lenhardt R. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. N Engl J Med. 1996;334(19):1209-1215.

Luna GK, Maier RV, Pavlin EG, Anardi D, Copass MK, Oreskovich MR. Incidence and effect of hypothermia in seriously injured patients. J Trauma. 1987;27(9):1014-1018.

McSwain JR, Yared M, Doty JW, Wilson SH. Perioperative hypothermia: Causes, consequences and treatment. *World J Anesthesiol* 2015; 4(3): 58-65.

The NICE Guideline Development Group. The management of inadvertent perioperative hypothermia in adults. Clinical Guideline 65. National Institute for Health and Clinical Excellence2008.

Ousey, K., Edward, K. L., Lui, S., Stephenson, J., Walker, K., Duff, J., & Leaper, D. (2017). Perioperative, local and systemic warming in surgical site infection: a systematic review and meta-analysis. Journal of wound care, 26(11), 614-624.

Schmied H, Kurz A, Sessler DI, Kozek S, Reiter A. Mild hypothermia increases blood loss and transfusion requirements during total hip arthroplasty. Lancet. 1996;347(8997):289-292.

Sessler, D. I. (2014). Temperature monitoring: the consequences and prevention of mild perioperative hypothermia. Southern African Journal of Anaesthesia and Analgesia, 20(1), 25-31.

Torossian, A., Bräuer, A., Höcker, J., Bein, B., Wulf, H., & Horn, E. P. (2015). Preventing inadvertent perioperative hypothermia. Deutsches Ärzteblatt International, 112(10), 166.

Wartzek, T., Mühlsteff, J., & Imhoff, M. (2011). Temperature measurement.

Zaza, K. J., & Hopf, H. W. (2019). Thermoregulation: Normal physiology, anesthetic effects, and perioperative considerations. In *Pharmacology and Physiology for Anesthesia* (pp. 300-310). Elsevier.

19

www.webbertraining.com/schedulep1.php

August 26, 2021	*(FREE Teleclass)* **BACTERIOPHAGE USE FOR INFECTION PREVENTION IN HEALTHCARE SETTINGS** Speaker: **Dr. Lynne Sehulster**
September 16, 2021	*(FREE Teleclass)* **MAINTAINING INFECTION PREVENTION - WE HAVE MET THE ENEMY AND HE IS US** Speaker: **Prof. Allison McGeer**, Sinai Health System, University of Toronto
September 16, 2021	*(FREE South Pacific Teleclass - Broadcast live from the New Zeland Infection Prevention and Control Nurses College conference)* **UNDERSTANDING THE SCIENCE BEHIND AOTEAROA NEW ZEALAND'S COVID-19 RESPONSE** Speaker: **Prof. Michael Baker**, University of Otago, New Zealand **Live broadcast sponsored by Schulke** schülke
September 23, 2021	**TWINDEMICS OF COVID & INFLUENZA IN HINDSIGHT** Speaker: **Prof. Robert T. Ball**, Medical University of South Carolina
	(FREE European Teleclass - Broadcast live from the Infection Prevention Society conference)


Thanks to Teleclass Education
PATRON SPONSORS
Diversey
diversey.com
VIROX
TECHNOLOGIES INC.
virox.com
gama healthcare
gamahealthcare.com
Purell
gojo.com
World Health Organization
Infection Prevention and Control Global Unit
who.int/infection-prevention/en