3M™ Normothermia Solutions

Own the zone.

Positive actions lead to better patient outcomes.

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Did you know?

The facts...

> Perioperative hypothermia is still a clinical problem with a high incidence and severe associated complications[1]
>
> **Prof. Anselm Bräuer**
> Consultant Anaesthetist

Only 30%

of patients are warmed during surgery[2]

> 50%

of patients experience post operative hypothermia[3]

Unintended hypothermia is easily preventable

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The benefits

Studies show maintaining core temp of >36°C results in:

Reduced rates of surgical site infection[4,11,13]

Increased patient comfort[4]

Reduced morbid cardiac events[4,12]

Reduction in the use of blood products[4,10]

Faster recovery time, shorter stay[4,9]

Cost savings[4,8]

£ £ £

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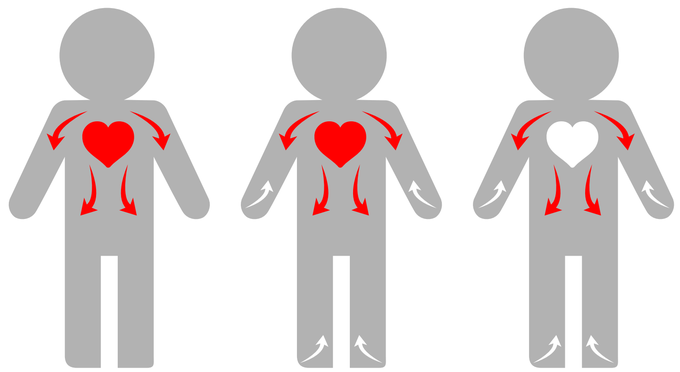
The effects of anaesthesia

Normothermia
= the body's ideal thermal state

Clinical hypothermia
= core body temp less than 36°C

Patients can lose up to 1.6°C core temperature in the first 60 minutes of anaesthesia[5]



Anaesthesia causes vasodilation, which allows blood to flow freely to the cooler periphery.

As the blood circulates it cools, returning back to the heart causing core temperature to drop.

This is called redistribution temperature drop (RTD).[6]

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Importance of maintaining normothermia

Temperature is a vital sign

If patient is below 36°C commence active warming.[6]

Take care, take core temperature!

Monitor

Continuously measure core temperature before, during and after surgery.

Record patient's temperature every 30 minutes during surgery and every 15 minutes in recovery.[6]

Pre-warm

Pre-warm to increase peripheral body temperature.

Start active warming 30mins before induction of anaesthesia.[6]

Maintain

Ensure your patient is at or above 36'C throughout the entire procedure.

Actively warm patient using a forced-air warming device, warm intravenous fluids using a fluid warming device, and continuously monitor core temperature.[6]

Did you know?

NICE now recommends measuring the patient's temperature using a site that produces either a direct measurement of core temperature, or a direct estimate of core temperature that is accurate within 0.5°C of direct measurement.[6]

NICE guidelines state that indirect estimates, such as infrared devices, should not be used to measure core temperature.[6]

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The 3M solution

Monitor core temperature

Knowing your patient's core temperature can help you respond quickly to help prevent and avoid complications.

The 3M™ Bair Hugger™ Temperature Monitoring System offers an accurate, non-invasive, continuous method to easily measure core temperature throughout the perioperative process.

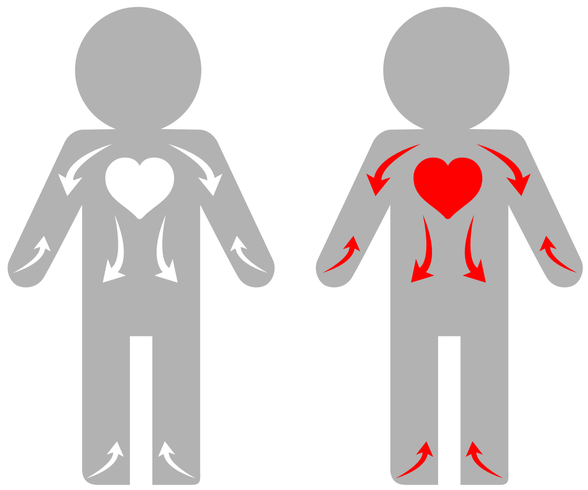
Did you know?

NICE now recommends zero heat flux technology as an accurate measurement of core temperature and recently published a medical innovation briefing on the Bair Hugger Temperature Monitoring System.[6]

Pre-warm with forced-air warming

Perioperative hypothermia is easier to prevent than treat.

Pre-induction warming with the 3M™ Bair Hugger™ Normothermia System banks heat in the patient's periphery, which can help reduce the drop in temperature caused by the redistribution temperature drop.[14]



Maintain patient normothermia

The 3M™ Bair Hugger™ Normothermia System includes a range of forced-air warming blankets and gowns, providing a reliable, effective solution to maintain normothermia during every stage of the surgical journey.

We have a blanket to suit every patient, every procedure, every time.

Infusion of cold fluids can reduce core temperature,[4] warming intravenous fluids with the 3M™ Ranger™ Blood and Fluid Warming System helps prevent this drop.

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Importance of maintaining normothermia

Patient warming

One of the least expensive and most cost effective things you can do to improve outcomes.

Average cost of a standard 3M patient warming blanket

= £5[7]

PACU stay (per hour)
Maintaining normothermia shortens postoperative recovery time[9]

Cost = £44[8]

Blood transfusion
Maintaining normothermia reduces surgical bleeding and the need for blood products[10]

Cost = £244[8]

Hospital stay (per hour)
On average hypothermic patients spend 19% longer in hospital[8]
Maintaining normothermia reduces length of stay[11]

Cost = £275[8]

Morbid cardiac event (ischemia)
A core temperature less than 35°C is associated with a two-threefold increase in myocardial ischemia[12]

Cost = £2014[8]

Surgical wound infections: minor surgery
Prewarming reduces the incidence of wound infection[13]

Cost = £950[8]

Surgical wound infections: major surgery
Maintaining normothermia reduces the risk of SSI's[11]
SSI's three times higher for hypothermic patients (19% vs. 6%)[11]

Cost = £3850[8]

A warm patient is a safer, happier, less expensive patient

Patient warming technical analysis

Clinical practice and costs have changed dramatically in 20 years, it is reasonable to revisit the estimates for costs associated with hypothermia.[15] The variables in the following equations are defined as follows:

CER = Control Event Rate
EER = Experimental Event Rate
ARR = Absolute Risk Reduction
RR = Relative Risk
NNT = Number Needed to Treat
n = number of patients
C_o = Cost of the Outcome (Surgical infections)
C_t = Cost of the Therapy (Warming blanket)
V = Value Index

Based on the 1999 meta-analysis, the following values may be computed:

$$ARR = [EER - CER] = [0.0695 - 0.1907] = 0.121$$

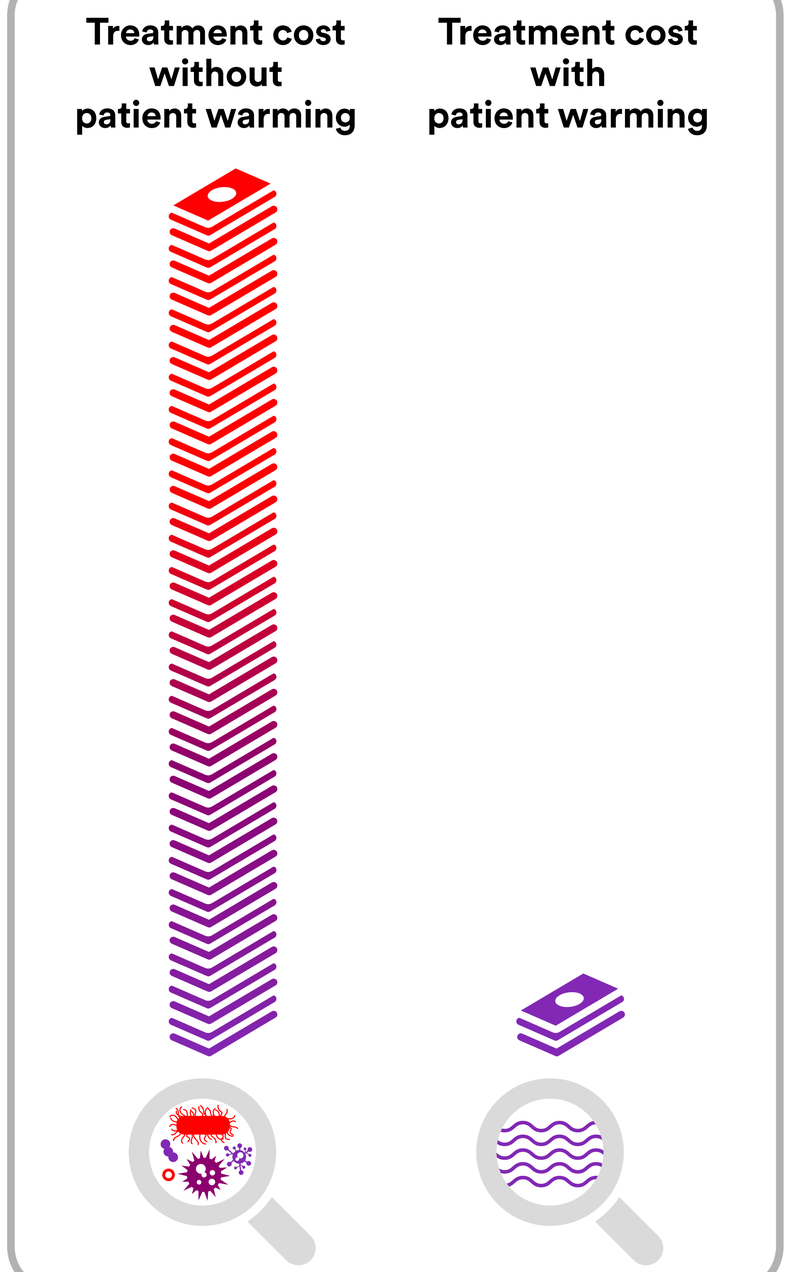
$$RR = \frac{EER}{CER} = \frac{0.0695}{0.1907} = 0.36$$

$$NNT = \frac{1}{ARR} = \frac{1}{0.121} = 8.25$$

In 1999, the estimated unit cost to treat a surgical site infection was between $4500 and $14,000, and the cost of a blanket was $18.[11,16,17] The Value index was derived as shown below.

$$V = \left[\frac{n}{[NNT]}\right]C_o - nC_t = n\left[\left(\frac{C_o}{[NNT]}\right) - C_t\right]$$

If $\left[\left(\frac{C_o}{[NNT]}\right) - C_t\right] > 0$, the therapy is worth the cost.



A recent meta-analysis from the Cochrane Database of systematic reviews was published in 2016, and contains new estimates for effect sizes using two more recent trials and comprising a total of 279 subjects.[18] A 2013 study conducted at four hospitals in the Johns Hopkins system found a mean additional cost of $34,434 to treat a surgical site infection.[19] A 2014 study in VA patients found additional costs of $23,755 to treat SSI.[20] Using the same analysis as before produces the following estimates.

$$ARR = [EER - CER] = [0.0468 - 0.1275] = 0.081$$

$$RR = \frac{EER}{CER} = \frac{0.0468}{0.1275} = 0.36$$

$$NNT = \frac{1}{ARR} = \frac{1}{0.081} = 12.4$$

In 2017, the cost of a blanket is about $6. Although the NNT has increased by approximately 50% since 1994, the cost of an infection has increased by over 140%, and the RR has stayed exactly the same. The value of the warming therapy was still well worth the cost as

$$\left[\left(\frac{C_o}{[NNT]}\right) - C_t\right] > 0.$$

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J387749.