The value of preoperative Warming

The ice age is over

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Objective:

• Does the wrapping of patients in insulating materials effect their core temperature, in other words, can we prevent hypothermia in the preoperative phase?

Project:

• 50 surgery patients dressed in standard hospital OR gowns in the perioperative phase, their temperature measured in the preoperative phase as the main parameter.
• 50 patients dressed in an insulating material, the Thermoflect® OR Gown (art 5145-500), in the perioperative phase, their temperature measured in the preoperative phase as the main parameter.

For both groups, temperature was measured prior to their procedure when they were given their premedication and on arrival at the operating theatre. We also measured as standard their postoperative temperature in the PACU and on discharge. These controls are not included in this study.

Patient group:
We selected patients who were to receive a Total Hip Prosthesis (THP) or a Total Knee Prosthesis (TKP). This patient category is one of the elective procedures at our hospital and we could therefore gather the data within a short timeframe.

All patients were informed of the research and took part in it voluntarily.

The data:
• The type of surgery.
• The type of anaesthesia.
• The gender of the patient.
• ASA classification.

The temperature was measured at the following times:
• After preparation in the department.
• On arrival at the operating theatre

All temperatures are measured with a tympanic Braun thermometer (Pro 4000 Welch Allyn T 6021). We chose this form of temperature measurement due to its feasibility: It is a standard measurement for all nurses so there were not too many additional activities or logistical issues.

Our anaesthesia department is already aware of the fact that the patient should remain covered as much as possible during the induction period and at the start of a loco-regional anaesthesia procedure and while positioning in the operating theatre. The literature has shown that there is always a drop in core temperature in this phase.

The measurements currently taken mainly focused on the intraoperative phase. During this phase, there were warmed cotton blankets, leg covers, warmed infusion and irrigation fluids and Forced Air Warming (FAW). We wished to discover if preoperative warming of the patients has a positive effect on the core temperature.
**Study**

**Research and results:**
Some points of interest in the department phase:
1. When the patient puts on his or her insulating clothes and when the temperature is measured.
2. How long patients have the insulating gowns on before they are taken to the operating theatre.
3. The time to transfer to the operating theatre, from the patient’s room through administration to the operating theatre.

- The patient receives the gown at the time of preparation for the surgery and their temperature is measured at the same time.
- Patients wear the gown for an average period of 31 minutes (+/- 43 minutes/26 minutes).
- The transfer time is 5 minutes, the distance is 250 metres.

A total of 117 patients were selected of which 105 patients are included in the study. 12 patients were excluded, 11 due to incomplete measurements and 1 patient gave intraoperative notice that she did not want to participate because she felt too warm; temperatures were normal but it was uncomfortable for the patient, Obesitas per Magna, BMI 50.

Obesity is not a contra-indication since the temperature regulation of such patients is the same as for patients with a normal BMI.

**Group 1, the standard gown group, 57 patients, 23x TKP and 34x THP.**
**Group 2, the Thermoflect® group, 48 patients, 24x TKP and 24x THP.**

**Anaesthesia:**
The THP group all received spinal anaesthesia with 3.0 ml Bupivacaine 0.5%/ glucose.

The TKP group received spinal anaesthesia, 3.0 ml Bupivacaine 0.5%/glucose and a femoral catheter for postoperative pain relief, Ropivacaine 0.375% 40 ml.

Both groups had a warm cotton blanket placed over them on arrival at the operating theatre.

Patients were sedated at their own request, with a bolus Diprivan pump or on a Midozalum bolus basis. Oxygen through a nasal catheter 1 to 3 litres/minute.

When patients arrived at the operating theatre they were covered with Forced Air Warming, Mistral Air®, a reflective upper body, set point 38ºC. and infusion fluids warmed to 38ºC, no infusion fluid warmer. Average OR time was 51 minutes to 80 minutes. Blood loss not above normal.

**Group 1: The standard gown group**
57 patients: 23x TKP, 9 men/14 women and 34x THP, 13 men/21 women.
Average decrease between department and arrival at operating theatre was 0.25ºC.
Highest decrease was the group of women, 9 times higher than 0.5ºC for 35 patients.
In the group of men, this was 3 times higher than 0.5ºC for 22 patients.
The number of patients who were normothermic 36ºC on arrival at the operating theatre:
- Temperature ≥ to 36ºC = 52
- Temperature ≤ 36ºC = 05.

The temperature in the period between preparation on the ward and arrival at the operating theatre. In the TKP group;
- 6x the temperature stayed the same or increased.
- 17x the temperature decreased.
In the THP group;
- 6x the temperature stayed the same or increased.
- 28x the temperature decreased.
For 57 patients:

- 12x the same temperature or an increase in temperature = 20%.
- 45x a decrease in temperature = 80%.

**Group 2: The Thermoflect® group**

48 patients: 24x TKP, 11 men/13 women and 24x THP, 7 men/17 women.

Average increase between department and arrival at operating theatre was 0.31°C.

The highest increase was in the male group; this was 8 times higher than 0.5°C for 20 patients.

In the female group this was 4 times higher than 0.5°C for 28 patients.

The number of patients who were normothermic 36°C on arrival at the operating theatre.

- Higher/equal to 36°C = 48

The temperature in the period of preparation and the arrival at the Operating Theatre.

In the TKP group;

- 1x a decrease in temperature.
- 23x an increase in temperature.

In the THP group;

- 4x a decrease in temperature.
- 20x an increase in temperature.

For 48 patients:

- 5x a decrease in temperature = 10%.
- 43x an increase in temperature = 90%.

**Conclusion:**

Thermoflect® patient gowns prove in this study to be more effective than our standard gown regarding patient temperature. Not one of the patients in the Thermoflect® group entered the OR as hypothermic, below 36.

The majority of patients were positive about the Thermoflect® gown. Some patients (6) stated they felt warm wearing a Thermoflect® gown in the postoperative phase. We did not find higher core body temperatures; after removing the Gown these patients felt better.

For patients in Group 1, 91% had a core temperature of 36 or higher. In Group 2, this was 100%. More significant was the average temperature divergence between start and arrival: For Group 1, a decrease of 0.25°C and in Group 2 an increase of 0.31°C, a delta of 0.5°C core body temperature during the first half hour.

**Advantages of preoperative warming:**

- The prevention of a drop in temperature attributed to the redistribution of warmth.
- The warming of preoperative patients before the actual start of the surgery is easier because they can be covered completely with a warm blanket or a FAW blanket without taking into account the position in the OR and the location of the incision.
- Patients stay warm during the preoperative phase when covered with Thermoflect® and monitors provided that you remain on alert.
- The vasodilatation caused by the priming often makes it easier to insert a good peripheral infusion.

A large proportion of the perioperative hypothermia is caused by the redistribution of warmth. The results of this study show that pre-operative warming of patients makes sense.

The use of active warming in the pre-operative phase is not sufficient to counteract all causes of hypothermia because some time is needed to provide warmth to the central compartment, (heart, lungs and brain stem).
Even with short surgical procedures, patients can demonstrate hypothermia due to the redistribution of warmth during the first hours of anaesthesia.

The literature indicates that preoperative warming of 30 to 60 minutes causes an increase in the core and skin temperature and it prevents the redistribution of warmth. In combination with pre-operative warming, this gives us the opportunity to avoid hypothermia and its complications completely.

**Literature:**


