

# Perioperative Control of Temperature - An Audit

## Introduction

Inadvertant perioperative hypothermia is a common complication of perioperative period and is defined as core body temperature less than 36 degrees celcius. Hypothermia may be classified into three categories

Mild hypothermia – 34-36 degrees.

Moderate hypothermia – 30-34 degrees.

Severe hypothermia- < 30 degrees.

Hypothermia can develop pre, intra and post operatively. The incidence ranges anywhere between 60-90% of all surgical patients and results when body's ability to maintain normothermia is diminished by the absence of protective reflexes such as shivering and piloerection due to anaesthesia and loss of heat during surgery [1].

## Methods

In this study we included 40 patients, ranging from age 16- and above, between ASA 1 and 5, undergoing short, intermediate and long surgeries. The classification of surgeries was done on the basis of duration of surgeries. Surgeries lasting less than 30 minutes duration were classified into short surgeries, surgeries lasting 30 minutes to 1 hr and 30 min as intermediate surgeries and surgeries lasting more than 1hour and 30 minutes were classified as long surgeries. Patients less than 16 years of age were excluded from the study. All the patients were randomly selected.

## Results

In our study we have found out that a temperature recording was taken in all the patients preoperatively, which was in accordance with the nice guidelines. About 27.5% of the patients were hypothermic prior to induction, and in none of these patients pre-operative measures were taken to combat hypothermia. Off these 27.5% patients who were hypothermic prior to induction, 81.8% remained hypothermic at the end of the operation. Of all the patients involved in the surgery, 45 % of the patients remained hypothermic post operatively in the recovery. Intraoperatively warming measures were used in 90% of the patients. Only 10% of the patients did not get any intraoperative warming measures. These included forced air warming devices, warmed iv fluids, both combined or none.

In terms of efficacy of the warming device a combination of forced air warming device and warmed iv fluids seem to be the most effective. Only 27% patients remained hypothermic in the recovery. Off those patients who just received forced air warming device as a intraoperative heating measure, about 50% of the patients remained hypothermic.

When no warming measure was used, that was in two patients both of them remained hypothermic. We also audited

### Research Article

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the percentage of patients who were hypothermic at the end of the surgery depending upon the classification of surgery as short surgeries, intermediate and long surgeries. Short surgeries lasted less than 30 min, intermediate anywhere between 30 min to 90 min and long surgeries lasting more than 90 minutes.

In our audit 50% of the patients undergoing minor surgeries remained hypothermic at the end of the surgery, about 53.8% of the patients undergoing surgeries of intermediate duration remained hypothermic and none of the patients undergoing major surgery were hypothermic (Table 1 & Figure 1).

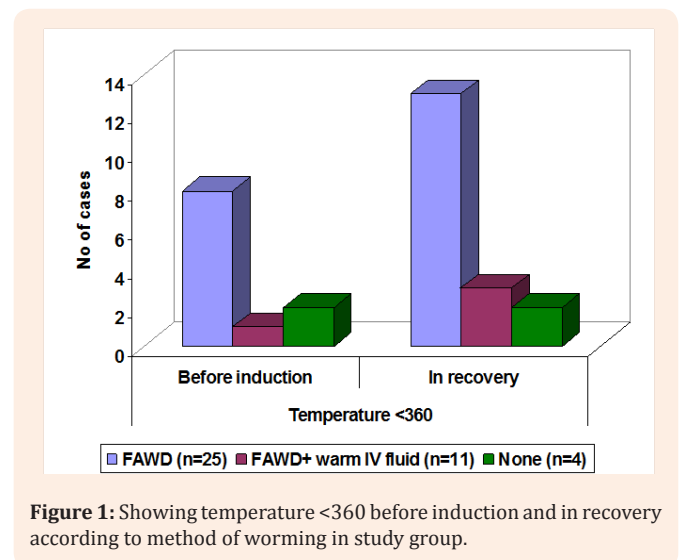


Figure 1: Showing temperature <36 before induction and in recovery according to method of warming in study group.

## Discussion

It is vital to maintain perioperative temperature within the normal accepted range. Inadvertent hypothermia is associated with a number of complications like increased risk of surgical site infections, delayed wound healing, which lead to increased hospital stay and increased cost to both the patient and the health

service. We could like to compare our results with the NICE guidelines, which are the accepted gold standard.

**Table 1:** Showing the patient numbers, the method of warming and the number of patients who were hypothermic prior to induction and the numbers that remained hypothermic in recovery.

Methods of Warming	n	Temperature <36.0	
		Before Induction	In Recovery
FAWD	25	8	13
FAWD+ warm IV fluid	11	1	3
None	4	2	2
Total	40	11 (27.5)	18 (45)
Chi-square		3.14	1.93
P Value		>0.05	>0.05

### Perioperative care

A. Patients (and their families and carers) should be informed that:

- Staying warm before surgery will lower the risk of postoperative complications.
- The hospital environment may be colder than their own home.
- They should bring additional clothing, such as a dressing gown, a vest, warm clothing and slippers, to help them keep comfortably warm.
- They should tell staff if they feel cold at any time during their hospital stay.

B. When using any temperature recording or warming device, healthcare professionals should:

- Be trained in their use.
- Maintain them in accordance with manufacturers' and suppliers' instructions.
- Comply with local infection control policies.

C. When using any device to measure patient temperature, healthcare professionals should:

- Be aware of, and carry out, any adjustments that need to be made in order to obtain an estimate of core temperature from that recorded at the site of measurement.
- Be aware of any such adjustments that are made automatically by the device used.

### Preoperative phase

The preoperative phase is defined as the 1 hour before induction of anaesthesia, during which the patient is prepared for surgery on the ward or in the emergency department, including possible use of premedication. During this period, each patient should be assessed for their risk of inadvertent perioperative hypothermia and potential adverse consequences before transfer to the theatre suite. Patients should be managed as higher risk if

any two of the following apply:

- ASA grade II to V (the higher the grade, the greater the risk) [2].
- Preoperative temperature below 36.0°C (and preoperative warming is not possible because of clinical urgency).
- Undergoing combined general and regional anaesthesia.
- Undergoing major or intermediate surgery.
- At risk of cardiovascular complications.

In our audit we have found that a risk stratification and the assessment of patients if they were high risk was not done in any of the patients. The patient's temperature should be measured and documented in the hour before they leave the ward or emergency department and if the patient's temperature is below 36.0°C, forced air warming should be started preoperatively on the ward or in the emergency department (unless there is a need to expedite surgery because of clinical urgency, for example bleeding or critical limb ischaemia). In our audit no preoperative forced air warming device was started in any of the patients who were hypothermic.

### Intraoperative phase

The intraoperative phase is defined as total anaesthesia time, from the first anaesthetic intervention through to patient transfer to the recovery area of the theatre suite. The NICE guidelines recommended patient's temperature should be measured and documented before induction of anaesthesia and then every 30 minutes until the end of surgery. This was a norm in our centre and was done in all the patients included in the audit. Induction of anaesthesia should not begin unless the patient's temperature is 36.0°C or above (unless there is a need to expedite surgery because of clinical urgency, for example bleeding or critical limb ischaemia). This was not done in our centre. Patients who are at higher risk of inadvertent perioperative hypothermia and who are having anaesthesia for less than 30 minutes should be warmed intraoperatively from induction of anaesthesia using a forced air warming device. All patients who are having anaesthesia for longer than 30 minutes should be warmed intraoperatively from induction of anaesthesia using a forced air warming device. The temperature setting on forced air warming devices should be set at maximum and then adjusted to maintain a patient temperature of at least 36.5°C.

All irrigation fluids used intraoperatively should be warmed in a thermostatically controlled cabinet to a temperature of 38-40°C. We did not look at this mode of warming the patient in our audit.

### Postoperative phase

The postoperative phase is defined as the 24 hours after the patient has entered the recovery area of the theatre suite. The patient's temperature should be measured and documented on admission to the recovery room and then every 15 minutes. This is regularly done in our centre and was done in 100% of the patients in the audit. The NICE guidelines also recommend that Ward transfer should not be arranged unless the patient's temperature is 36.0°C or above. However we did not audit this in our study

because it was logistically difficult to follow on the patients once they were in the recovery. The guidelines also recommend that the temperature should be measured and documented on arrival at the ward and every four hour hence forth. Our audit did not extend to beyond the operation theatres and the recovery and hence we failed to audit this.

### Recommendations

- I. It would be recommended to assess a patient preoperatively for the risk of hypothermia.
- II. If the patient is at high risk of hypothermia, measures to warm the patient should be started before the patient comes to the theatre and it should be made sure that the patient is normothermic prior to induction.

III. Regardless of the nature of the surgery both forced air warming devices and warmed iv fluids should be started as measures to reduce the incidence of inadvert hypothermia, as both the measures are more effective when employed together, rather than any single method.

IV. A further audit is warranted in the recovery and the ward to which the patient goes to see how we comply with the NICE guidelines to prevent hypothermia.

### References

1. Prevention of perioperative hypothermia, national institute of clinical excellence. Management of inadvertent perioperative hypothermia in adults.
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