

UNINTENTIONAL HYPOTHERMIA FREQUENCY IN THE PERIOPERATIVE PERIOD OF ELECTIVE SURGERIES

Frequência de hipotermia não intencional no perioperatório de cirurgias eletivas

Frequência de hipotermia não intencional sin perioperatório de cirurgias eletivas

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ABSTRACT: Objective: To analyze the frequency of unintended hypothermia in patients undergoing elective surgery in the perioperative period, scoring its relationship with the type of anesthesia. **Method:** Cross-sectional, descriptive, and quantitative approach study with a sample of 53 patients aged between 18 and 90 years, developed in a surgical center of a private hospital in the Midwest region of the São Paulo State. **Results:** The female gender appeared as a major variable (79.3%), and 96.3% of the assessed patients presented hypothermia, ranging from mild to moderate. The number of hypothermic patients undergoing spinal anesthesia was higher when compared to those undergoing general anesthesia, both in the operation room (93.5%) and in the postanesthetic room (96.8%). **Conclusion:** Hypothermia is a common event that affects a large portion of patients undergoing surgical procedures, so it is essential that nurses early identify the occurrence of this phenomenon to provide a qualified and safe care to these patients.

Keywords: Hypothermia, Surgicenters, Perioperative period

RESUMO: Objetivo: Analisar a frequência de hipotermia não intencional em pacientes submetidos a cirurgias eletivas no período perioperatório, pontuando sua relação com o tipo de anestesia. **Método:** Estudo transversal, descritivo e de abordagem quantitativa, com amostra de 53 pacientes com faixa etária entre 18 e 90 anos, desenvolvido num centro cirúrgico de hospital privado da região Centro-oeste do estado de São Paulo. **Resultados:** O sexo feminino apareceu como variável preponderante (79,3%) e 96,3% dos pacientes avaliados apresentaram hipotermia, com variação entre leve e moderada. O número de pacientes hipotérmicos submetidos à raqui-anestesia foi maior quando comparado àqueles submetidos à geral, tanto na sala de operação (93,5%) quanto na sala de recuperação pós-anestésica (96,8%). **Conclusão:** A hipotermia é um evento comum que acomete uma grande parcela de pacientes submetidos a procedimentos anestésico-cirúrgicos, assim, torna-se imprescindível que o enfermeiro identifique precocemente sua ocorrência, a fim de oferecer uma assistência qualificada e segura a esses pacientes. **Palavras-chave:** Hipotermia. Centros cirúrgicos. Período perioperatório.

RESUMEN: Objetivo: Analizar la frecuencia de hipotermia no intencional en pacientes sometidos a cirugías electivas en el período perioperatorio, señalando su relación con el tipo de anestesia. **Método:** Estudio transversal, descriptivo e de abordaje cuantitativo, con muestra de 53 pacientes en la franja etaria de 18 a 90 años, desarrollado en un quirófano de hospital privado de la región Centro-oeste del estado de São Paulo. **Resultados:** El sexo femenino apareció como variable preponderante (79,3%) e 96,3% de los pacientes evaluados presentaron hipotermia, con variación entre leve y moderada. El número de pacientes hipotérmicos sometidos a anestesia raquídea fue mayor al ser comparado a aquellos sometidos a general, tanto en sala de operación (93,5%) como en la sala de recuperación post-anestésica (96,8%). **Conclusión:** La hipotermia es un evento común que afecta una gran parte de pacientes sometidos a procedimientos anestésico-quirúrgicos, así, se vuelve imprescindible que el enfermero identifique precozmente su ocurrencia, a fin de ofrecer una asistencia calificada y segura a esos pacientes. **Palabras clave:** Hipotermia. Centros quirúrgicos. Período perioperatorio.

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INTRODUCTION

Hypothermia is defined as body temperatures below 36°C, in which the body is unable to produce enough heat to perform their functions¹. It may be classified into unintentional (accidental) and therapeutic, the early (focus of this study) occurs mainly among patients submitted to anesthetic-surgical procedures or trauma victims, among other causes. It derives from various isolated or associated factors, with excessive heat loss, inhibition of physiological thermoregulation, or lack of appropriate prevention measures. Therapeutic hypothermia on the other hand, also called “triggered” hypothermia, is set, consciously, by the medical team, with the objective of treatment. It may also be classified as mild (from 36 to 34°C), moderate (between 34 and 30°C), and severe (lower than 30°C)^{2,3}.

This is one of the main complications in the perioperative period, and to provide the surgical center (SC) nursing team with the necessary tools is the only way to reduce the rates of those complications⁴. It may affect over 70% of patients who undergo anesthetic-surgical procedures, and it may cause significant complication^{5,6}, such as increase in morbidity rates, increase in the incidence of infection of the surgical site, increase of heart demand and of oxygen in the presence of tremors, and damages to the platelet function.

Therefore, in order to offer assistance directed to the surgical patient needs, nursing professionals need to identify early the occurrence of this alteration, thus enabling the reduction of possible complications and avoiding delay in their recovery⁷.

With regard to the maintenance of perioperative normothermia, the *American Society of Peri Anesthesia Nurses* (ASPAN)⁸ instructs that the advanced age and female gender should be considered as a risk factor for hypothermia. Thus, the nursing team should developed a plan of care during these patients' admission to minimize the risk of hypothermia among them. Nursing professional must ensure an appropriate environment for the development of care, involving, among others, the physical and social environments⁹.

The perioperative hypothermia has been prevalent among elderly patients, due to their compromised thermoregulatory system. Age is a risk factor for the development of hypothermia, and that equal to 60 years or over is a predictive factor for hypothermia during surgery. These patients need greater care in the postoperative period,

due to their reduced thermoregulatory response, when compared to patients in other age groups, as a result from the alteration in the vasoconstrictor response acquired with age¹⁰.

The prevention of hypothermia is very important as their negative effects hinder the recovery of patients and the current literature still diverges in relation to the most efficient method for warming the patient¹⁰.

Even though hypothermia is a common complication in the anesthetic recovery (AR), as well as in the whole perioperative period, the lack of studies on this subject is evidenced in a review study of the literature¹¹. In this study, 297 examples were found, 4 of which approached hypothermia as a nursing diagnosis with main related factors, and 1 of which recommended the prevention of this complication¹¹.

In this context regarding hypothermia in the perioperative period, as well as their consequences for the recovery of patients who have undergone surgeries, the following question arises: What is the frequency of unintentional hypothermia in the perioperative period and how does it relate to anesthesia?

OBJECTIVE

To analyze the frequency of unintentional hypothermia in the perioperative period among patients who have undergone elective surgeries in a SC of a private hospital in the Midwest region of the state of São Paulo, and to define their relation to the type of anesthesia.

METHOD

A cross-sectional descriptive study with a quantitative approach, developed in a private hospital institution, located in the Midwest region of the state of São Paulo. It is a medium-sized hospital, consisting of a SC, the unit of the institution where the research was carried out, three operation rooms (OR), one birth room (BR) and a postanesthesia care unit (PACU), with capacity for up to three patients and three beds reserved for bed-day patients.

The study included 53 patients with elective surgeries scheduled for the period proposed to conduct the research. Among these patients, 42 were women and 11 were men, with age ranging from 18 to 90 years. Data collection lasted 2 months (from July 1 to August 31, 2012).

Patients were selected randomly according to the eligibility criteria, namely: age ≥ 18 years old, having an elective surgery scheduled in the referenced health institution for the period of data collection, being present on the day of the surgery and agreeing to take part in the research. After agreeing to participate in the research, patients were instructed during the preoperative period, within the SC, about the objectives of the research and signed the informed consent.

The study followed the rules and ethical procedures proposed in Resolution No. 466/2012 and was approved by the Research Ethics Committee of the institution on April 26, 2012, protocol No. 413.

For the implementation of the research a script of the case study and a script for the systematic observation were used, which consisted of, respectively, the following information:

- Observation of the nursing care given to the patients submitted to elective surgeries, as well as the physical, material, and human resources needed, in addition to the nursing actions directed to the patient and teamwork;
- Location of the research and main activity; observation of the activities carried out by team and the materials utilized, in addition to the application of the data collection tool, which was used in OR and PACU, which in turn consisted of characterization of sample data regarding the pre-, peri- and postoperative periods.

To verify the temperature of the patients, an ear thermometer by G-Tech was used, measuring the temperature from the admission until their exit from the SC, with a 15-minute interval between each verification.

For the analysis of the data, a descriptive statistical analysis was used and for the verification of the variations in

temperature an one-way analysis of variance (ANOVA) was used with a post hoc Tukey test.

Prior to this procedure, normality data were analyzed by means of the Shapiro-Wilk test. For this analysis, a significance level of $p \leq 0.05$ was used.

RESULTS

A total of 53 patients were evaluated, being 42 (79.3%) women and 11 (20.7%) men, aged between 18 and 90 years. A higher concentration of individuals aged between 30 and 42 years was observed.

Female gender appeared as a predominant variable; however, it is noteworthy that the gender was not statistically significant in this study, with a $p > 0.05$.

Table 1 shows that 50 (94.4%) patients had hypothermia in the OR, whereas 48 (94.1%) patients had hypothermia in the PACU (Table 2); 2 patients were not referred to the PACU.

In the OR, 3 (5.7%) patients did not become hypothermic. The same situation (3 patients, representing 5.9%) was observed in the PACU.

Comparing the frequency of hypothermia according to age range, it is noticeable that, in the groups from 18 to 30 years of age, from 42 to 54 years of age, and from 78 to 90 years of age, all patients had hypothermia during the perioperative period.

Tables 1 and 2 shows that 86.8% of patients had mild and 7.6% had moderate hypothermia in the OR, while in the PACU, 88.2% of them had mild and 5.9% had moderate hypothermia.

Patients were analyzed separately by the type of anesthesia, considering the risk factors for hypothermia

Table 1. Patients according to age range and classification of hypothermia in the operation room.

Age range (years)	Classification of hypothermia						
	<i>n</i>	Mild	%	Moderate	%	No hypothermia	%
18–30	8	8	100.0	–	–	–	–
30–42	20	17	85.0	2	10.0	1	5.0
42–54	8	8	100.0	–	–	–	–
54–66	5	3	60.0	1	20.0	1	20.0
66–78	10	9	90.0	–	–	1	10.0
78–90	2	1	50.0	1	50.0	–	–
Total	53	46	86.8	4	7.6	3	5.7

among surgical patients. Two types of anesthesia were included in the evaluation process: the spinal and the general anesthesia.

Tables 3 and 4 shows that the number of patients with hypothermia who have undergone spinal anesthesia was higher when compared to those who were submitted to the general anesthesia both in the OR (93.5%) and in the PACU (96.8%).

Graphic 1 shows the variation of temperature during the perioperative period, divided into two moments, in the OR and in the PACU, when the ear temperature was measured every 15 min, from the moment the patient entered the SC until they left it.

In the OR, the average temperature remained stable up to the 15-minute. From then on, there was a statistically significant decrease compared to both temperatures measured at the

Table 2. Patients according to age range and classification of hypothermia in the postanesthesia care unit.

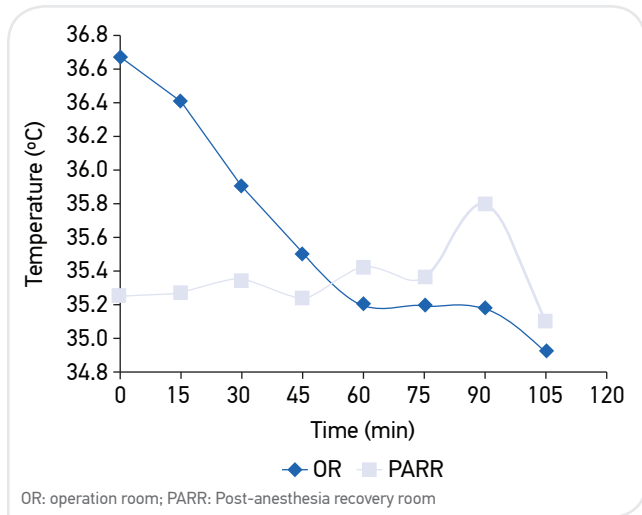
Age range (years)	Classification of hypothermia						
	n	Mild	%	Moderate	%	No hypothermia	%
18-30	8	8	100.0	-	-	-	-
30-42	20	20	100.0	-	-	-	-
42-54	8	7	87.5	-	-	1	12.5
54-66	4	3	75.0	-	-	1	25.0
66-78	9	5	55.6	3	33.3	1	11.1
78-90	2	2	100.0	-	-	-	-
Total	51	45	88.2	3	5.9	3	5.9

Table 3. Patients submitted to general anesthesia and frequency of hypothermia.

Age range (years)	Operation room					Postanesthesia care unit				
	n	With hypothermia	%	Without hypothermia	%	n	With hypothermia	%	Without hypothermia	%
18-30	2	2	100.0	-	-	2	2	100.0	-	-
30-42	9	8	88.9	1	11.1	9	8	88.9	1	11.1
42-54	3	3	100.0	-	-	3	2	66.7	1	33.3
54-66	3	3	100.0	-	-	2	2	100.0	-	-
66-78	4	3	75.0	1	25.0	4	4	100.0	-	-
78-90	1	1	100.0	-	-	2	1	50.0	1	50.0
Total	22	20	90.9	2	9.1	22	19	86.4	3	13.6

Table 4. Patients submitted to spinal anesthesia and frequency of hypothermia.

Age range (years)	Operation room					Postanesthesia care unit				
	n	With hypothermia	%	Without hypothermia	%	n	With hypothermia	%	Without hypothermia	%
18-30	6	6	100.0	-	-	6	6	100.0	-	-
30-42	11	11	100.0	-	-	11	11	100.0	-	-
42-54	5	4	80.0	1	20.0	5	5	100.0	-	-
54-66	2	1	50.0	1	50.0	2	1	50.0	1	50.0
66-78	6	6	100.0	-	-	6	6	100.0	-	-
78-90	1	1	100.0	-	-	1	1	100.0	-	-
Total	31	29	93.5	2	6.5	31	30	96.8	1	3.2



Graph 1. Mean variation of temperature in the perioperative period.

admittance and at the 15-minute. From the 60- to the 90-minute, the mean temperature remained virtually constant. From the 90-minute on, the mean temperature suffered a severe drop, showing a statistically significant difference in relation to the admittance, the 15-, and the 60-minute temperatures.

In the PACU, there was no statistically significant difference between the moments, meaning that the patients were admitted with a given temperature and were discharged with the same temperature. Thus, many patients left the OR and entered the PACU in a hypothermic state.

DISCUSSION

Despite not having presented statistical significance, the female gender is an important variable to be pointed out as a risk factor for the development of hypothermia. Women have less lean body mass and higher rates of body mass surface compared to men, which may make them more susceptible to heat losses to the environment. However, women may present a lower heat loss in the perioperative period compared to men, as their bodies have higher percentages of adipose tissue, which works as a protective layer¹⁰.

All patients had hypothermia during the perioperative period. A special emphasis to groups of patients between 18 and 30 years of age, from 30 to 42 years of age, and from 42 to 54 years of age, whose rate of hypothermic patients was high in the OR, considering that the literature points out the age of 60 years old or older as a risk factor for the development of this condition¹¹⁻¹³.

With regard to the type of anesthesia, hypothermia was higher among patients submitted to spinal anesthesia, which may be related to the number of cesarean births that corresponded to 30% of all surgeries during the research period. It is also worth noting that when patients are submitted to general anesthesia, they leave the OR awoken after the surgery, that is, not under the effect of anesthesia, and thus, regaining their normal physiological responses. In contrast, the duration of the spinal anesthesia is three hours on average, which reduce the threshold of cutaneous vasoconstriction, which is one of the thermoregulatory mechanisms of temperature¹⁴.

The results of this research corroborate other studies, demonstrating that hypothermia is a risk for patients in the perioperative period. Despite this scenario, the production of works in this area is still scarce¹¹⁻¹³.

A study¹³ indicate that hypothermia has been triggered in the OR by the lack of appropriate preventive measures, resulting in complication in the AR period.

The identification of risk factors in the pre- and perioperative period is necessary, which, whether alone or as a group, may be controlled to minimize morbidity and mortality of patients who have undergone surgical procedures^{15,16}.

These data suggest that the nurse should handle the risk factors for hypothermia since the preoperative period, considering that the effects of this condition may be minimized and/or avoided throughout the surgical process, which will contribute significantly for the unit dynamics in addition to providing safety to the patient.

It is also worth mentioning that there is a higher risk of developing unintentional perioperative hypothermia when general and regional anesthesia are combined. This is due to the deficiency in the thermoregulatory mechanisms of general anesthesia in addition to the hindered ability to keep the compensation mechanisms (such as tremors, peripheral vasoconstriction, and thermal sensation), common in regional anesthesia, contributing to lower mean temperatures^{17,18}.

In contrast to the results of this research, another study data concerning the occurrence of hypothermia in PACU showed that general anesthesia caused a greater incidence of hypothermia in the immediate postoperative period¹⁹.

This study shows that hypothermia is one of the main complications in the perioperative period. Therefore, there is a belief that providing the necessary tools to the nursing team in the SC is the only path to reduce the incidence of these complications.

Planning of effective interventions, such as a care protocol for hypothermia prevention and short duration educational interventions that may contribute significantly to the effective knowledge improvement on the subject, is necessary⁴.

Regardless of the type of anesthesia, it is valid to understand that hypothermia triples the incidence of myocardial adverse effects, increases the risk of infections of the surgical site, causes bleedings, and is associated to the increase of both the hospitalization period and the health costs. It also changes the pharmacokinetics and pharmacodynamics of most anesthetics, prolonging the recovery from anesthesia²⁰.

However, it should be highlighted that measuring the body temperature is not included as a routine in the evaluation process for PACU discharge, even knowing the importance of normothermia for the patients and the influence of unintentional hypothermia in the possible postoperative complications¹⁴.

The knowledge and comprehension on pathophysiology, the complications and the forms of prevention, therefore, are important so that the nursing professional in the SC performs their role adequately⁴.

Other studies also observed that patients with temperatures below 36°C were discharged from the PACU. This fact suggests a review of the procedures applied and a continuous training of the team involved in the care process¹⁴.

The results of another study on hypothermia in patients in the perioperative period are important to highlight. In this study 80% of patients remained hypothermic within 30 minutes of permanence in the PACU, with axillary temperature between 35.1 and 35.9°C. After 30 minutes of permanence in the PACU, most of these patients started reheating, which was confirmed by axillary temperatures between 36 and 37.2°C in 60% of patients after 60 minutes¹³.

Among the limitations of this study we emphasize the size of the sample; however, the methodology of the statistical analysis ensures the reliability of the results.

Another limiting factor is related to the absence of patients' self-reported on thermal comfort. This question was not formulated to the patients.

FINAL CONSIDERATIONS

The SC plays an extremely important role in the hospital scenario and in the life of many people, as it is an enclosed environment, involving peculiarities in the care of the surgical patient. The nurse should conduct a humanized care, considering that many of these patients will undergo a surgical procedure for the first time.

Both the results of other studies and those observed in this study show a high incidence of hypothermia among surgical patients.

Most patients had mild hypothermia, with a temperature decrease from the 30-minute of the surgical procedure, considering that the decrease became more significant with time and many of these patients are taken to the room whilst still in a hypothermic state.

Thus, we should highlight how important and necessary is the development of mechanisms which may contribute to the early detection of this condition, as well as the importance of investments in providing tools for the team, aiming at the prevention and the offering of a secure and quality care.

There is also a need for projects of continuous education, to inform about the importance of body temperature control during the perioperative period, as well as measures which may be implemented to early detect the condition and/or to reduce the number of hypothermic patients.

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