T.R.N.C

NEAR EAST UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

NURSES' AWARENESS AND PRACTICES OF PERIOPERATIVE HYPOTHERMIA PREVENTION

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MASTERS IN NURSING (SURGICAL NURSING)

Advisor:

Prof. Dr. Nurhan Bayraktar

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Approval form

The Directorate of Graduate School of Health Sciences

This study has been accepted by the thesis committee as a MS thesis in Nursing (Surgical Nursing) Master Program.

Thesis Committee:

Chair: Professor Ümran DAL YILMAZ
Near East University

Supervisor: Professor Nurhan BAYRAKTAR
Near East University

Member: Assoc.Professor Gülten SUCU DAĞ
Eastern Mediterranean University

Approval:

According to the relevant articles of the Near East University Postgraduate Study-Education and Examination Regulation, this thesis has been approved by the above-mentioned members of the thesis committee and the decision of the Board of Directors of the Institute.

Professor, K. Hüsnü Can BAŞER

Director of Graduate Institute of Health Sciences

DECLARATION

I hereby declare that this thesis study is my own study, I had no unethical behavior in all stages from planning of the thesis until writing thereof, I obtained all the information in this thesis in academic and ethical rules, I provided reference to all of the information and comments which could not be obtained by this thesis study and took these references into the reference list and had no behavior of breeching patent rights and copyright infringement during the study and writing of this thesis.

OUSMAN JALLOW

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Hemşirelerin periopratif hipoterminin önlenmesine ilişkin farkındalıkları ve uygulamaları

Öğrencinin Adı: Ousman Jallow

Danışmanı: Prof. Dr. Nurhan Bayraktar

Anabilim Dalı: Hemşirelik (Cerrahi Hastalıkları Hemşireliği)

ÖZET

Giriş: Perioperatif hipotermi potansiyel olarak hayatı tehdit eden komplikasyonlara neden olabilecek bir sorundur. Hemşirelerin perioperatif hipoterminin önlenmesi ile ilgili bilgi ve uygulamalarını değerlendirmeye ve geliştirmeye ihtiyaç vardır.

Amaç: Bu çalışmanın amacı hemşirelerin perioperatif hipoterminin önlenmesine ilişkin farkındalıklarını ve uygulamalarını belirlemektir.

Yöntemler: Tanımlayıcı kesitsel tipteki bu çalışma Haziran 2020'de Edward Francis Eğitim Hastanesi'nde gerçekleştirilmiştir. Bu çalışmaya toplam 53 hemşire gönüllü olarak katılmıştır. Çalışmada kullanılan anket Amerikan periOperatif Kayıtlı Hemşireler (AORN) ve Ulusal Sağlık ve Bakım Mükemmelliği Enstitüsü perioperatif hipotermi kılavuzlarına dayanılarak geliştirilmiştir. Verilerin analizinde tanımlayıcı istatistikler, Pearson korelasyonu, Student t-testi ve Tek yönlü ANOVA kullanılmıştır.

Bulgular: Çalışmanın sonuçları hemşirelerin perioperatif hipotermiyi önlemenin tüm alanlarında (genel, ameliyat öncesi, ameliyat sırası ve ameliyat sonrası) yüksek düzeyde farkındalığa sahip olduklarını, ancak uygulama seviyelerinin düşük olduğunu göstermiştir.

Sonuçlar: Çalışmanın sonuçlarına dayanarak, hemşirelerin perioperatif hipoterminin önlenmesine ilişkin bilgi ve uygulamalarını geliştirmek için politikaların geliştirilmesi, perioperatif hipotermi önleme kılavuzlarının uygulanması ve sürekli eğitim önerilmiştir.

Anahtar kelimeler: Hipotermi, Perioperatif hipotermi önleme, Komplikasyonlar, Hemşirelik.

Awareness of nurses and practices on perioperative hypothermia prevention

Student's Name: Ousman Jallow
Advisor: Prof. Dr. Nurhan Bayraktar
Department: Nursing (Surgical Nursing)

ABSTRACT

Introduction: Perioperative hypothermia is a problem that can cause potentially life-threatening complications. There is a need to assess and improve the knowledge and practices of nurses regarding perioperative hypothermia prevention.

Objectives: The aim of this study is to determine the awareness and practices of nurses regarding perioperative hypothermia prevention.

Methods: This descriptive cross-sectional study was conducted at the Edward Francis Teaching Hospital in June 2020. A total of 53 nurses voluntarily participated in this study. The questionnaire used in this study was developed based on the American periOperative Registered Nurses (AORN) and National Institute for Health and Care Excellence perioperative hypothermia guidelines. Descriptive statistics, Pearson correlation, Student t-test & One-way ANOVA were used in the analysis of the data.

Results: The result of the study showed that nurses had high level of awareness on all domains of perioperative hypothermia prevention (general, preoperative, intra-operative & post-operative), however practice levels were found to be low.

Conclusions: Based on the results of the study, development of policies, implementation of the perioperative hypothermia prevention guidelines and continuous education to improve nurses knowledge and practices were recommended.

Key words: Hypothermia, Perioperative hypothermia prevention. Complications, Nursing.

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Abbreviations

American periOperative Registered Nurses (AORN)

American Society of Anesthesiology (ASA)

Edward Francis Teaching Hospital (EFTH)

Intensive Care Unit (ICU)

National Institute for Health and Care Excellence (NICE)

Post Anesthetic Care Unit (PACU).

1. INTRODUCTION AND AIM

1.1 Definition of the Problem

Maintaining a constant internal environment is crucial to human life. The inner state of humans can be regulated by means of a process called thermoregulation. Thermoregulation is characterized as the process which biological systems use to preserve a stable internal condition even when the external environment changes (Eva & Sandeep, 2019). Temperature regulation is an integral aspect of human life. The human body will not be able to function efficiently without thermoregulation and would eventually die (Lim et al, 2008; Charkoudian, 2010). The normal core temperature of humans is 37 degrees Celsius, which is equivalent to around 98.6 degrees Fahrenheit (Eva & Sandeep, 2019). This is the temperature at which the processes of the human body function together at their fullest, which is why the body has so closely controlled mechanisms (Eva & Sandeep 2019).

Hypothermia is a health problem that is characterized as a body temperature below 35 ° C. (95°F). According to Gully, (2011) Underneath this temperature, the body loses greater heat than it produces. Hypothermia triggers significant deterioration of critical organs, such as the heart, contributing to arrhythmia; the kidneys contributing to renal failure; and the brain, resulting to alterations in mental state, such as confusion or lack of consciousness (Peiris et. al, 2018).

Perioperative hypothermia, a form of hypothermia that emerge during the perioperative phase, identified as a core a body temperature of temperature of less than 36 ° C is a frequent complication in perioperative patients (Kurt & Andrea, 2018). Inadvertent perioperative hypothermia occurs when appropriate actions are not taken to ensure that surgical clients' core temperature stay within that acceptable levels during surgical procedures. Even though published

researches on the frequency of perioperative hypothermia differ based on the patient demographic, type of operation, clinical environment, and concept of hypothermia used, research has demonstrated that 26% to 90% of patients undergoing elective procedure establish postoperative hypothermia (Moola & Lockwood, 2011). A survey of 255 patients having major colorectal surgical procedure revealed that 74 % of patients had mild hypothermia during surgery (Mehta & Barclay, 2014). A cross - sectional survey of 3132 clients under general anesthesia in 28 hospitals in China found that the overall incidence of intraoperative hypothermia was 44.3 per cent, in which the total incidence rates of hypothermia were 17.8 per cent, 36.2 per cent, 42.5 per cent and 44.1 per cent within 1 h, 2 h, 3 h and 4 h, respectively, following induction of anesthesia (Yi et. al, 2017). Another research in Ethiopia found that the total occurrence rate of hypothermia in the preoperative, intraoperative and postoperative phases to be 16.2%, 53.2% and 31.3% respectively (Fekede & Sahile, 2016).

Perioperative hyperthermia can lead to serious complications in surgical patients. For example, blood catecholamines, which confine peripheral blood vessels, increase the blood pressure, heart rate and increase the cardiac afterload. This therefore elevates the overall burden on the cardiovascular system by plummeting the oxygen intake of the heart muscles (Kasai et al., 2003). Hypothermia could also inhibit respiratory function, leading to rapid, shallow respiration (Ghaffaripour et. al, 2013). Shivering occur as a compensatory mechanism, leading to an increase in spontaneous muscle contraction and oxygen intake of almost 300 per cent. At the end of the day, reduced breathing and elevated cardiac output per minute will lead to irregular heartbeat, heart failure and myocardial infarction. All of these negative consequences delay recovery after surgical intervention. Perioperative hypothermia as well also delay discharge from the recovery room, increase postoperative infection rates, and exasperate thermal discomfort (Cooper, 2006; Seamon

et. al 2012; Yi et.al, 2017). The value of perioperative hypothermia in healthcare facilities should not be ignored. As shown by the results of a research undertaken by (Ralph, 2019) in Australia, the burden of inadvertent perioperative hypothermia on the healthcare systems is estimated to be approximately $1,259,725,856 (Ralph, 2019). According to Sessler (2016), perioperative hypothermia is associated with adverse effects such as coagulopathy, increased transfusion demands, surgical site inflammation, impaired medication synthesis, extended healing and thermal disturbance. Hypothermia can also inhibit the efficacy of medications and extend the patient's recovery and hospital stay (Panagiotis et. al, 2005; Lista et. al, 2012).

Many factors lead to the development of perioperative hypothermia. The theater leads to the development of hypothermia, mainly via radiant heat loss. Approximately 60 percent of the most significant heat loss is due to radiation (Horosz & Malec-Milewska, 2013). Irrespective of the fact that most operating rooms have in-room thermostats able to control the ambient temperature, disagreements regarding appropriate temperature controls can emerge depending on distinct levels of personal convenience clothing (surgical gowns) and also other heat exposure (under hot lights) (Horosz & Malec-Milewska, 2014). Other factors such as age, sex, type & duration of surgery, type of anesthesia and postoperative complications (e.g. blood transfusion requirements, low hemoglobin, low hematocrit, surgical site infection, sepsis, pneumonia, mortality) lead surgical patients to perioperative hypothermia (Akers et.al, 2019).

Inadvertent perioperative hypothermia is a common but preventable complication of perioperative procedures, which is associated with poor outcomes for patients. There are guidelines such as The National Institute for Health and Care Excellence (NICE) guideline & The American periOperative Registered Nurses Association (AORN) that are used by health practitioners to prevent & manage perioperative hypothermia (NICE, 2008; AORN, 2016).

The AORN and NICE guideline contain interventions that provide methods for the assessment and management of surgical patients to prevent hypothermia throughout the perioperative cycle thereby preventing complications surgical patients may encounter as a result of perioperative hypothermia.

Due the complications that perioperative hypothermia is likely to cause surgical patients, nurses must play a crucial role in the prevention of perioperative hypothermia throughout the perioperative cycle. Nurses should employ interventions such as the use perioperative pharmacologic vasodilation & prewarming prior to anesthesia, passive warming, active warming, warming of intravenous and irrigation fluids, warming of anesthetic gases to help prevent perioperative hypothermia, thereby minimizing the risk for post-operative complications (Madrid et. al, 2016). Thus, nurses should be aware of the causes, as well as complications of hypothermia so that preventative interventions can be employed to minimize the risk of hypothermia. Preoperative assessment is essential to enable identification of at-risk patients. Simple precautions taken by nurses will dramatically reduce the amount of heat lost, decrease the likelihood of associated complications and eventually increase the short-and long-term rehabilitation of patients (Burger & Fitzpatrick, 2009). Reducing the exposure of the skin, supplying sufficient bed sheets for transport to theatre, and informing patients about the significance of maintaining the perioperative warm are all highly significant. It is also worth exploring the usage of forced air warming preoperatively, as studies indicate that the implementation of active warming may be effective in the prevention of hypothermia during the perioperative phase (Burger & Fitzpatrick, 2009).

Since nurses play a primary role in caring for and monitoring of patients throughout the perioperative continuum, a better understanding of nurses' knowledge and practices of perioperative hypothermia is an important part of improving patient outcomes. Determining the knowledge and practices of nurses regarding perioperative hypothermia prevention may be useful in improving their perioperative hypothermia prevention strategies, thus increasing the quality of perioperative care. A study on the topic was not found in The Gambia. Therefore, the result of this study will help to shed light on the awareness and practices of nurses regarding perioperative hypothermia prevention in The Gambia.

1.2 Aim of the Study

The aim of the study is to determine nurse's awareness and practices regarding perioperative hypothermia prevention. Study questions are as followings:

- What is the level of awareness of nurses on perioperative hypothermia prevention?
- What are practices of nurses regarding perioperative hypothermia prevention?
- Is there any correlation between the level of awareness and practices of nurses on perioperative hypothermia prevention?
- Is there any difference between the descriptive data, and awareness and practices of nurses on perioperative hypothermia prevention?

2. BACKGROUND

2.1 Definition of hypothermia

Lengthy exposure to very cold temperatures causes hypothermia (CDC, 2019). According to James et. al, (2019) hypothermia defines the condition under which cold stressor overcomes the body's system for temperature regulation. When the body is subjected to cold temperatures, it starts losing heat faster than it generates. Long exposures will gradually use the accumulated energy in the body, which results in lower body temperatures (CDC, 2019). The American College of Surgeons recognizes degrees of hypothermia as being: mild (32-35°C), moderate (30-32°C), severe (below 30°C) (Keane, et. al, 2000). Hypothermia can be classified as accidental or intentional, primary or secondary, and by the degree of hypothermia. In general, accidental hypothermia occurs from unexpected exposure of an inadequately prepared individual; examples include insufficient protection for a vulnerable person, someone trapped in a winter storm or motor car crash. Intentional hypothermia is an exacerbated state normally guided towards neuroprotection following a circumstance at risk (usually after cardiac arrest) (Polderman, 2009). Primary hypothermia occurs owing to the exposure to the environment, with no underlying medical problem causing temperature control damage (Long et. al, 2005). Secondary hypothermia is low body temperature arising from a medical condition that lowers the temperature set-point (James et. al, 2019). A very low body temperature impacts the brain, leaving the person unable to think properly or move well (CDC, 2019). Although hypothermia is more likely to occur at extremely cold temperatures, it may occur even at moderate temperatures (above 40 ° F) when a person is drained by rain, sweat, or submerged in cold water (CDC, 2019).

2.2 Perioperative hypothermia

Perioperative hypothermia at any time during the perioperative cycle is characterized as a core body temperature < 36 ° C (Forbes et al. 2009). The human body is designed to secure a regular body temperature of in between 36 degrees Celsius and 38 degrees Celsius by combining heat loss and heat gain (Collins et. al, 2018). Preserving a normal body temperature during the surgical experience enhances the patient's odds of preventing postoperative complications (Geiger et. al, 2012). In a typical non-anesthetized individual, the hypothalamus — body thermostat — regulates the core temperature hormonally, utilizing knowledge obtained from thermoreceptors in the hypothalamus, spinal cord, abdominal organs, and other essential locations (Collins et. al, 2018). Peripherally, thermoreceptors interact with the hypothalamus (Paulikas,2008). Hypothalamus utilizes this central and peripheral temperature details to control body temperature through a number of methods. Sweating is produced first, accompanied by vasodilation to cool the body. In regular cases, shivering is the first-line approach to increased core temperature, despite being detrimental to the body by increasing oxygen and caloric intake (Collins et. al, 2018). When the shivering is not sufficient, vasoconstriction is used to limit heat to the core (Diaz & Becker, 2010). Vasoconstriction induced by hypothermia limits the supply of blood and therefore oxygen and nutrients to tissues, thereby limiting immune function and increase likelihood for infection (Lynch et. al, 2010). The rise in oxygen demand combined with a reduction in blood flow due to shivering and hypothermia could eventually lead to myocardial infarction and death. Induction of anesthesia, whether regional, neuraxial or general anesthesia, affects the body's thermoregulation mechanisms by closing down the natural reaction of the body's thermoregulator, the hypothalamus (Khan et. al, 2010). The result of a small-scale study done by Bilgin, 2016 at Kocaeli University in Turkey shows the post-operative hypothermia incidence rate as 45.7%.

2.3 Causes of Perioperative Hypothermia

The human body displaces heat to the atmosphere in four ways: radiation, conduction, convection, and evaporation (Insler & Sessler, 2006; Horosz & Malec-Milewska, 2014). Radiation is the infrared heat transfer. Conduction requires the transmission of heat by direct contact with the material (i.e. operating room table). Convection is the transfer of heat on the basis of air passage (i.e., cool air blowing through the body). Evaporation refers to the loss of heat due to skin sweat or loss of moisture related to organ access to the open environment. The most important heat loss, about 60 per cent, is produced via radiation (Horosz & Malec-Milewska, 2013). Certain anesthetic agents interfere with the generation of heat as they induce vasodilation, muscle relaxation and disturbance of the shivering reaction. Muscle relaxants meddle with the distribution of nerve impulses that stimulate muscle movement, which reduces the generation of heat (Burger& Fitzpatrick, 2009; Horosz & Malec-Milewska, 2013; Farley A & McLafferty, 2008). Volatile anesthetic gasses used to control anesthesia induces vasodilation, resulting in decreased blood supply to the skin and a radiant reduction of heat to the atmosphere (Burger& Fitzpatrick, 2009; Horosz & Malec-Milewska, 2013; Farley & McLafferty, 2008). Lengthy exposure of patients whilst in the theatre also contribute to this effect (Madrid et. al, 2016).

Certain factors such as anesthesia, low environmental temperatures, cold intravenous fluids, antiseptic solutions and premedication contribute to the development of hypothermia (Inal et.al, 2017). The vasoconstriction of normal shallow veins can decrease heat loss in the cold but sedative and anesthetic agents will block this natural response. Vasoconstriction is thus impossible and heat loss due to blood flow increases. This effect therefore prevents blood flow to the peripheral compartments. According to Sobczak, 2014, spinal anesthesia will at the same time hamper main thermoregulatory function, create internal body heat redistribution and protect the body from

breaking. This occurs because the body loses heat effectively to the atmosphere during surgery. Surgical patients with hypothermia may predispose them to inadvertent hypothermia during the perioperative period. The risk for unintended perioperative hypothermia was reported to be very wide (1.5%–20%). Extremely old people, cachetic (those that have elevated metabolism & cancer) and elevated likelihood of anesthesia (ASA 3-4) are at high risk of occurrence of hypothermia in people with burn injury, hypothyroidism, and corticoadrenal insufficiency (Bilgin, 2017).

2.4 Pathophysiology of hypothermia

The body's core temperature in the "thermoneutral region" is tightly controlled between 36.5 ° C and 37.5 ° C, outside of which thermoregulatory mechanisms are typically enabled. The body maintains a constant body temperature by changing the heat production and the heat loss. At rest, individuals generate 40-60 kilocalories (kcal) of heat per square meter of body surface area through cellular metabolism production, most notably in the heart and liver. With striated muscle contraction the heat output decreases; shivering increases the heat production rate 2-5 times (James et. al, 2019).

Heat loss happens through many processes, the most important of which, under cold and dry conditions, is radiation (55-65 per cent of heat loss). Conduction and convection are responsible for about 15% of additional heat losses, and respiration and evaporation are responsible for remainder. The most common causes of accidental hypothermia are conductive and convective heat loss or direct heat transfer to another surface or flowing air (James et. al, 2019). Conduction is a particularly notable mechanism for heat loss in drowning / immersion accidents as the thermal conductivity of water is up to 30 times that of air (James et al, 2019). Hypothalamus regulates thermoregulation by increased heat retention (peripheral vasoconstriction and behavioral reactions)

and heat output (shivering and increasing rates of thyroxine and epinephrine). Such mechanisms may be affected by modifications of the Central Nervous System. The lower limit for shivering is 1 degree less than that for vasoconstriction and is regarded the body's last resort to control warmth (Sessler, 2009). Thermal-preservation mechanisms may be overrun in the face of cold stress, and core temperatures may decrease as a result of exhaustion or glycogen depletion (James et al, 2019). Hypothermia impacts almost all organ systems. The most major impact is seen in the cardiovascular system and in the Central Nervous System. Hypothermia results in a lower depolarization of cardiac pacemaker cells, leading to bradycardia. Although this bradycardia is not vagally induced, it can be refractory to standard therapies such as atropine. Mean arterial pressure and cardiac output decrease, and the electrocardiogram (ECG) could show the characteristic J or Osborne wave. While generally associated with hypothermia, the J wave may be a normal variant and is occasionally seen in sepsis and myocardial ischemia. (James et al, 2019). According to Snyder, 2005 the clinical picture of perioperative patients depends on the severity of hypothermia, the root cause, and other characteristics such as age, underlying disease, and chronic health problems. As follows, different levels of hypothermia affect the neurological, cardiovascular, respiratory, renal and gastrointestinal (GI) systems.

Neurologic effects. Each 1º C decrease in core temperature decreases cerebral blood flow by 6% to 7%. This can be manifested by confusion, hallucinations, maladaptive behaviors, increasing drowsiness, ataxia, dysarthria, amnesia, or impaired judgment. A core temperature below 82.4° F (28° C) induces coma (Snyder, 2005; Yartsev, 2019).

Cardiovascular effects. Initially, the sympathetic nervous system responds to hypothermia by causing peripheral vasoconstriction, hypertension, tachycardia and decreased heart rate. However, as the cooling progresses, the heart rate slows, the cardiac production declines, and

the likelihood of arrhythmias such as ventricular fibrillation and asystole increases. The heart of the patient may not respond to defibrillation of pacemaker stimulation and cardioactive drugs, and its ability to metabolize drugs is reduced, so active core rewarming is the primary treatment for cardiac arrest (Various rehearsal techniques appear later).

Respiratory effects. Tachypnea in mild hypothermia is followed by a progressive decrease in respiratory rate and volume of each ventilation. Deteriorating hypothermia causes bronchospasm and loss of protective airway reflexes, putting the patient at risk of aspiration. Pulmonary edema and apnea occur when hypothermia is severe (Snyder, 2005)

***Renal effects*:** Renal cell disorder and reduced levels of vasopressin lead to the formation of a huge volume of diluted urine (cold diuresis). Hypovolemia is caused by diuresis plus fluid leakage into the interstitial tissues. Vasoconstriction that arises with hypothermia could shroud hypovolemia, which then occurs as a sudden shock or cardiac arrest during re-warming (rewarming collapse) when peripheral vasculature dilates (Danzl, 2019).

***Gastrointestinal effects*.** Low body temperature decreases the liver's ability to metabolize drugs and eliminate toxins and may trigger bleeding problems. The motility of GI smooth muscle decreases, causing paralytic ileus (Snyder, 2005; Yartsev, 2019).

2.5 Complications of perioperative hypothermia

Hypothermia may increase morbidity rates by impairing different systems and functions. Shivering involves involuntary muscular movements that occur when the temperature of the body rises against the cold (Sessler, 2001). Moreover, shivering during the healing and reanimation phases is the most unpleasant experience for postoperative patients.

Cardiac complications are the main cause of postoperative morbidity. Lengthy ischemia (lower blood flow) normally causes cell injury. The treatment of factors such as body temperature is however crucial. Sessler noted that hypothermia induces noradrenalin release and peripheral vasoconstriction and therefore hypertension (Sessler, 2001; Sessler, 1991). While it has been proposed that both of them raise the likelihood of acquiring myocardial ischemia, there are a few empirical results that specifically illustrate the association between hypothermia and perioperative cardiovascular incidents. In a study (Frank et. al, 1997), only three cases of myocardial infarction were reported.

Certain research findings have shown that intraoperative hypothermia coexists with vasoconstriction, which is an independent factor that slows down wound healing and induces a rise in the number of surgical site infections (Kurz et. al,1996; Melling et. al, 2001).

Except in moderate hypothermia (35 ° C), platelet functions are impacted; enzymatic functions are changed and physiological coagulation processes are compromised. Decreased platelet production causes inflammation and exacerbates the need for transfusions (Rajagopalan et. al, 2008).

Moderate hypothermia often amplifies the effectiveness of certain drugs and causes them to be unstable by lowering the metabolic rate. Apparently, this influence is normal amongst elderly patients (Heier et. al, 1991; Heier et. al, 2006; Leslie et. al, 1995).

Based on the above, it has been stated that unexpected non-therapeutic hypothermia should be viewed as a negative effect during local and general anesthesia (Sessler et. al 1991; Bush et. al, 1995; Putzu et. al, 2007). Measurement of body temperature is often important for early diagnosis of unintended hypothermia and for the maintenance of normothermia during surgery.

2.6 Methods of perioperative hypothermia management

In order to preserve normothermia during anesthesia and operation, it is important to minimize radiation, reduce skin heat loss due to convection and conduction, avoid vaporization from uncovered surgical areas and prevent heat loss due to intravenous fluids and irrigation fluids. The consequence of heat loss that can arise as a result of the usage of cold gasses for inhalation or insufflation of body cavities is poor since the heat ability of the gasses is small (Birch et. al, 2011). The procedures to be done to control body temperature are as follows:

1. Interventions which may prevent the re-distribution of heat and resulting loss of heat (e.g. preoperative pharmacological vasodilation and heating of the skin prior to anesthesia)

2. Passive heating devices that inhibit heat loss and hypothermia, for example, by increasing the temperature of the room, passive insulation of uncovered parts of the body, usage of closed or semi-closed anesthesia loops and administration of low-flow anesthesia.

3. With regard to the usage of active heating systems; the performance of such systems relies on many aspects, such as the setup of the dev ice, the method of heat transfer, the location of the device on the patient and the region of the environment to be used for heat transfer The devices used for this task include infrared lights, electronic covers, covers or sheets with hot water cycles, hot air or convective air conditioning systems, heated iv fluids , irrigation fluids, moisturized and filtered anesthetic gases, and filtered carbon dioxide in laparoscopic procedures. In order to improve metabolism and boost energy expenditure, IV feeding is encouraged. The study carried out by Madrid et. al, 2016 showed the use of air blowing systems in patients who have undertaken abdominal surgery and are at risk of infection during preoperative, intraoperative or both periods had a minimized risk of infection and complications at the surgical site compared to those who have not been using active heating systems. In addition, patients were reported to have a decreased rate of major cardiovascular complications in patients shown to have cardiovascular risk factors

(Madrid et. al, 2016). The research also illustrated improved patient satisfaction by maintaining the core temperature within regular intervals. The patients also had a lower blood loss, although the impact on the blood transfusion rate was not apparent (Madrid et. al, 2016)

2.7 Guidelines for perioperative hypothermia prevention

There are guidelines such as The National Institute for Health and Care Excellence (NICE) guideline & The American periOperative Registered Nurses Association (AORN) that are used by health practitioners to prevent & manage perioperative hypothermia (NICE, 2008; AORN, 2016). The National Institute for Health and Care Excellence (NICE) guideline for perioperative hypothermia is classified into perioperative, intra-operative and post-operative care. It was developed in 2008 and later revised in 2016. The following constitute the updated snippets of the guideline (NICE, 2008).

2.7.1 NICE perioperative hypothermia guideline

The perioperative care includes; informing patients to stay warm prior to surgery to minimize the risk for complications after surgery. The hospital environment might be colder than their homes hence they should bring along additional clothing such as dressing gown. They should be advised to inform hospital staffs when they feel cold during their hospitalization. Special attention should be given to the comfort of patients having difficulties to express them during perioperative phase. Health professionals that use temperature recording or warming devices should be well trained about their use, maintaining the devices according to the manufacturer and supplier`s manual. The practice should also align with local infection control policies. Healthcare

practitioners should be aware of and make any adjustments needed to obtain estimate of core temperature from the recorded site of measurement and also be aware of the changes made automatically be the device utilized. Measurements of core temperature in recent studies have shown to be accurate to within 0.5ºC of direct measurement. The sites of temperature measurements are pulmonary artery catheter, distal esophagus, urinary bladder, zero heat-flux (deep forehead) Sublingual, axilla and rectum. Direct estimates should not be used for adults undergoing surgery (NICE, 2008)

The preoperative care includes preparing the client for surgery at the ward or the emergency department which probably include premedication. Patients scheduled for surgery should be assessed for their risk of inadvertent perioperative hypothermia. Patients with American Society of Anesthesiologists (ASA) grade II to V, preoperative temperature below 36.0°C (and preoperative warming is not possible because of clinical urgency), those undergoing combined general and regional anesthesia, undergoing major or intermediate surgery or those having a high risk of cardiovascular complications are at higher risk for inadvertent perioperative hypothermia. Before departing the ward or Emergency room or the patient`s room, the patient`s temperature should be measured. If the temperature is less than 36.0°C, initiate active warming in the ward or emergency room for 30minutes except in urgent circumstances like bleeding or critical limb ischemia. Active warming should be continued throughout the intraoperative phase. When possible, the patient should be allowed to walk to the theatre (NICE, 2008).

During the intra-operative phase, the patients' temperature should be taken and documented prior to anesthesia induction and then every 30 minutes until the end of surgery. For all patients coming into the theatre with a temperature less than 36.0°C, standard critical incident reporting should be done. Anesthesia induction should not be done unless the clients' temperature

36.0°C or more (except in emergency surgeries). The theatre's room temperature should be at least 21 ° C once the patient is exposed. After establishing active warming, the theatres room temperature can be reduced to allow better working conditions. The use of devices to cool the surgical team should also be taken into consideration. The patient should be well covered throughout the surgery to conserve heat and only be exposed during surgical preparation. Fluid warming devices should be used to warm Intravenous fluids (500mls or more) and blood products to 37°C. Surgical patients undergoing anesthesia for less or more than 30 minutes and are at high risk for inadvertent perioperative hypothermia should be warmed by active warming device. In a situation where active warming is not suitable a resistive heating blanket or resistive heating mattress should be considered. Thermostats controlled cabinet to a temperature of 38°C to 40°C should be used to warm irrigation fluids (NICE, 2008).

The post-operative phases basically start 24hrs after the surgical patient enters the recovery area of the theatre. The patients' temperature should be monitored and documented on arrival to the recovery room and then every 15 minutes. The patient should be transferred to the ward unless if the temperature is less than 36.0°C. When hypothermic the patient should be warmed using active warming until they become warm before transferring them into the ward. The surgical patient should be kept warm when back to the ward. The temperature of the patients should be recorded on arrival and be taken and documented as part of a routine four hourly observations. Patients should be provided with at least 1 cotton sheet, 2 blankets or a duvet. Use active warming if the temperature of the patient is less than 36.0°C while in the ward. Active warming should utilize until they are comfortably warm. The patients' temperature should be taken and documented at least every 30 minutes while warming (NICE, 2008).

2.7.2 American periOperative Registered Nurses Association (AORN) Guideline

The American periOperative Registered Nurses Association (AORN) has several recommendations. The main aim of the guideline is to provide a method for assessing patients for perioperative hypothermia, prevention of inadvertent hypothermia and to develop policies, procedures and education for perioperative personnel regarding the maintenance of patient normothermia. (AORN, 2016)

The key point of the first recommendations include assessing patient by Registered nurses during the perioperative phase for factors that could lead to inadvertent hypothermia. Such factors may include; room temperature lower than 20 degree Celsius (68-degree Fahrenheit), the type and duration of planned Anesthesia, factors related to patients. The assessment should be communicated to all members of the perioperative team (AORN, 2016).

The second key point stipulate that the patients` temperature should be measured at all the phases of the perioperative period. The method for temperature monitoring should be chosen based on the criteria for a procedure. The site where the temperature is monitored should be documented in the patients` file. The patient's temperature reading should be communicated among colleagues at all times (AORN, 2016)

The third key point of the guideline recommend that for all stages of perioperative treatment, the perioperative Registered Nurses will create an individualized care plan and incorporate the measures selected to avoid unplanned hypothermia. After a collaborative discussion among team members, an appropriate warming method should be chosen. This warming method should be chosen based on the planned surgical procedure, positioning of the patient, Intravenous access sites and warming-equipment constraints. Active and passive warming method could be

used. Taking into accounts patient needs a period of perioperative warming period could be instituted. If hypothermia is identified prior to surgery, interventions to normalize patients` body temperature should be initiated before transferring the patient to the theatre. Forced-air warming, warm-water warming blanket, conductive/ resistive device, passive warming may be used. Anesthesia gases can be warmed during surgery by active warming method. Warm Intravenous fluids should be given as demonstrated by specific patient needs. Warmed irrigation fluids (33 degree Celsius to 40 degrees Celsius (91.4-degree Fahrenheit to 104-degree Fahrenheit)) may be administered. To maintain normothermia, ambient room temperature might be increased in certain clinical situations and utilized in combination with other measures. Radiant warming devices might be used. Upon admission to the Post anesthetic care unit, if a patient becomes hypothermic, methods of warming should be initiated. To maintain normothermia, certain measures that can be taken include, warming method used, warming-device identifier, temperature settings when applicable, should be recorded in the patients` file (AORN, 2016).

The fourth key point of the guideline include quality measuring activities which should measure the prevalence of inadvertent hypothermia, negative effects of thermoregulation, compliance with the use of consistent temperature measurement throughout the perioperative phase, compliance with inclusion of temperature and thermoregulation interventions in the hand-over report and documenting the patient care related to thermoregulation (AORN, 2016)

2.8 Nurses' roles in perioperative hypothermia prevention

The American perioperative Registered Nurses (AORN) & The National Institute National Institute for Health and Care Excellence (NICE) guideline provide method for the prevention and management of hypothermia throughout the perioperative cycle. Since hypothermia

is associated with negative consequences as well as a decrease in patient satisfaction, it is crucial to maintain normothermia throughout the perioperative cycle (Frank et al. 2000; Fossum et. al, 2001; AORN, 2017; Hegarty, 2009, Giri et. al, 2013). Nurses play a crucial role in assessment, prevention and management of perioperative hypothermia. Therefore, a better understanding of nurses' knowledge of perioperative hypothermia is an important part of improving patient outcomes. (Giuliano & Hendricks ,2017). A study by Ireland et. al, 2006 on nurses and medical personnel working at a single trauma unit in Australia evaluating their awareness and understanding of unintended hypothermia and its impact on trauma patients showed that nurses have limited knowledge regarding perioperative hypothermia. The role of nurses includes the utilization of The AORN & NICE guideline to prevent perioperative hypothermia.

Nurses play a crucial role during the preoperative phase by;

- Assessing for any factors related to hypothermia such as a temperature below 36°C.
- Prewarming patients.
- Monitoring and documenting patient's temperature.

During the intraoperative phase, nurses should;

- Use thermostats-controlled cabinet to temperature of 33° C to 40° to warm Irrigation fluids
- Warm intravenous fluids and blood products to a temperature of 37°C.
- Warm patients using active warming method
- Cover patients throughout the surgery
- Maintain ambient room temperature which can be adjusted once active warming is initiated.
- Monitor and document patient's temperature every 30 minutes

During the post-operative phase, nurses should;

- Hypothermic surgical patients should be warmed using active warming until they become warm before transferring them to the ward
- Provide at least 1 cotton sheet, 2 blankets or a duvet to help maintain normothermia
- Monitor and document patient's temperature every 15 minutes whiles in the Post Anesthetic Care Unit (PACU).
- Include thermoregulation interventions and site of temperature measurement in hand over reports (AORN, 2016; NICE, 2008).

3. MATERIAL AND METHODS

3.1. Study design

The study was conducted with a descriptive and cross-sectional design.

3.2. Study Setting

This research was carried out at the Edward Francis Teaching Hospital (EFTH) in the capital of Gambia, Banjul. The hospital is a 547-bedded tertiary hospital, which was established in 1853 by the British Government. The EFTH is the main referral hospital in the Gambia. The EFTH provides consultant / general services in various clinical disciplines: including Obstetrics & Gynecology, Pediatrics, Pathology & Laboratory Medicine, Internal Medicine, Orthopedics, General Surgery, Radiology (including CT Scan), Physiotherapy and Pharmacy. Located some 200 meters away, the EFTH Polyclinic provides vital primary care services and also dental services to the entire country. The study was carried out at the operating theatre, intensive care unit (ICU), orthopedic unit, female & male surgical ward, accident & emergency surgical ward and the maternity unit. The perioperative hypothermia preventive practices at EFTH include; covering of patients with blanket, temperature measurement, warming of Intravenous fluids & blood products and putting off or adjusting the air conditioning when the patient becomes hypothermic.

3.3. Sample

The study was performed on the nurses who work at the operating theatre, ICU, orthopedic unit, female & male surgical ward, accident & emergency surgical ward and maternity ward of the Edward Francis Teaching Hospital. A total of 64 nurses work in these departments. All voluntary nurses were included in the sample of the study. Eleven nurses declined to participate in this survey

and the final sample was composed of 53 nurses, with an access rate of 82.8 %. This low sample is as a result of understaffing at EFTH and the unwillingness of certain nurses to participate in the study.

3.4. Study Tools

The data was collected using a questionnaire developed by the researcher based on the guidelines of the American periOperative Registered Nurses Association (AORN) and National Institute for Health and Care Excellence (NICE) perioperative hypothermia prevention (AORN, 2016; NICE, 2008) (Appendix 1). The questionnaire consists of three sections. The section A is regarding the demographic characteristics of nurses constitutes 8 questions. The section B is divided into four parts. Part one consists of 8 statements on general knowledge about perioperative hypothermia prevention, part 2 consist of 5 statements on perioperative hypothermia prevention, part 3 consist of 6 statements on intraoperative hypothermia prevention and part 4 consist of 5 statements on post-operative hypothermia prevention with three choices (True, False, don't know). Section C consists of 11 questions on hypothermia prevention practices with four choices (Always, Sometimes, Never, Explanation).

3.5. Data Collection

Data was collected using a questionnaire in June 2020. The questionnaires were administered on nurses while they are in the wards or clinics using self-completion method during duty shift and collected once completed. Completion of the questionnaire take almost 30 minutes.

3.6. Ethical Consideration

Ethical approval was obtained from Institutional Reviews Board (IRB) of Near East University (Appendix 2) and Institutional Review Board of the Edward Francis Teaching Hospital before conducting the study (Appendix 3). All nurses were given adequate information about the research, its aim and objective, consent was obtained to ensure the willingness to voluntarily participate in the study.

3.7. Data Analysis

All the analyses were performed using SPSS software version 26.0. The data was first assessed for any error in entry and coding. The categorical variables were analyzed using frequency, percentages, mean and standard deviation. “True”, “False” and “Don’t know” were used to evaluate statements on awareness. Comparisons were made using only correct answers on awareness and gender, age, educational level and working experience. Pearson correlation was used to determine the difference between the correct answers of awareness and always practices of nurses. Student t-test & One-way ANOVA were used to determine the differences between correct answers of awareness with gender, age, educational level and working experience. The same test was done for always practices with gender, age, educational level and working experience. For all the tests, $p<0.05$ was considered significant. For each statement on awareness, the answers were categorized as “correct answer” and “wrong answer”. Later, a variable known as “Correct answer score” was created which constituted only of “correct answer”. Descriptive statistics were later used to calculate the mean and standard deviation using the correct answer score. With regards to “always practice”, for calculating means and standard deviation, a variable known as “Always practice score” was created. Only respondents that choose always practice were recorded under

this variable. Descriptive statistics were used to calculate the mean and standard deviation from the "Always practice score".

4. RESULTS

Table 4.1 Socio-demographic characteristics of study participants (N=53)

Descriptive characteristics	**N**	%
Gender		
Male	12	22.6
Female	41	77.4
Age (Mean: 29.9)		
20-25	**7**	13.2
26-30	26	46.1
>= 31	20	37.7
Working experience		
<= 5	34	64.2
6-10	18	34.0
>11	1	1.9
Educational level		
Enrolled nursing diploma	4	7.5
Registered nursing diploma	14	26.4
Bachelor degree	35	66.0
Ward		
Female surgical	7	13.2
Male surgical	7	13.2
Orthopedic	9	17.0
Maternity	9	17.0
ICU	7	13.2
Theatre	7	13.2
Accident & emergency surgical	7	13.2
Training on hypothermia prevention		
Yes	17	32.7
No	35	67.3
Educational source (N=16) *		
School	7	43.8
In-service education	4	25.0
Online references	5	31.3
Need of training on hypothermia prevention		

Yes	35	66.0
No	18	34.0

*** N reduced because of the unanswered questions**

In this descriptive and cross-sectional study conducted with aim of analyzing the awareness and practice of nurses regarding perioperative hypothermia prevention, among the nurses, 77.4% were female and the mean age of the nurses was 29.9 years. The majority of nurses had less than or equal to 5 years working experience. A 66.0% of the participants had bachelor degree, 17% of them work at the maternity unit and orthopedic ward. The majority of the nurses stated that they have not received training on perioperative hypothermia prevention (67.3%). A 43.80% of the nurses have received a training on perioperative hypothermia prevention from school. Most nurses said to need training on perioperative hypothermia (66.0%) (Table 4.1).

Table 4.2 Nurse's responses on awareness of perioperative hypothermia prevention. (N=53)

Statements on perioperative hypothermia prevention	**True/false**	**Correct answer**		**Wrong answer / I don't know**	
		N	**%**	**N**	**%**
Part 1. General knowledge					
The internal environment of humans can be maintained by thermoregulation.	(T)*	52	98.1	1	1.9
Perioperative hypothermia at any time during the perioperative cycle is characterized as a core body temperature < 35 ° C.	(T)*	51	96.2	2	3.8
Perioperative hypothermia is associated with complications such as changes in drug metabolism, healing complications, shivering, clotting defects, cardiac morbidity and prolonged post-anesthetic recovery.	(T)*	42	79.2	11	20.8
To minimize surgical complications post-operatively, nurses should advise patients to bring along additional clothing to help them stay warm prior to surgery**.**	(T)*	33	62.3	20	37.7
The pulmonary artery catheter, distal esophagus, urinary bladder, zero heat-flux	(T)*	41	77.4	12	22.6

are some of the sites for temperature measurements					
Nurses should be well trained and knowledgeable about the use of both temperature recording and warming devices	(T)*	51	96.2	2	3.8
Forced-air warming devices, warm water circulating devices and conductive devices are not some of the devices for warming surgical patients	(F)**	30	56.6	23	43.4
The method for temperature monitoring should not be chosen based on the criteria for a procedure	(F)**	33	62.3	20	37.7
Part 2. Preoperative hypothermia prevention					
Patients with a temperature below 36.0°C undergoing anesthesia & those having a high risk of cardiovascular complications are at higher risk for inadvertent perioperative hypothermia	(T)*	46	86.8	7	13.2
It is not necessary to measure patients' temperature in the hour before departing the ward since it will be measured at the theatre.	(F)**	46	86.8	7	13.2
Except in urgent circumstances, preoperative patients with temperatures of less than 36.0°C should be warmed for 30 minutes using active warming methods.	(T)*	40	75.5	13	24.5
Special attention should be given to the comfort of surgical patients having difficulties to express themselves.	(T)*	50	94.3	3	5.7
The method for warming surgical patients should be chosen based on the planned surgical procedure, positioning of the patient, Intravenous access site and warming equipment constraints.	(T)*	44	83.0	7	17.0
Part 3. Intraoperative hypothermia prevention					
Critical incidence reporting is not necessary for patients coming into the theatre with a temperature of less than 36.0°C.	(F)**	48	90.6	5	9.4
The theatre's room temperature should be at least 21 ° C which can be adjusted to allow	(T)*	47	88.7	6	11.3

better working once active warming is initiated.					
Thermostats controlled cabinet to temperature of 33° C to 40° should not be used to warm Irrigation fluids.	(F)**	38	71.7	15	28.3
Fluid warming devices should be used to warm Intravenous fluids (500mls or more) & blood products to 37°C.	(T)*	51	96.2	2	3.8
Regardless of the temperatures of patients before leaving the ward or emergency department, they should be warmed using active warming method once in the theatre	(T)*	44	83.0	9	17.0
The surgical patient should be well covered throughout surgery to conserve heat and only be exposed during surgical preparation.	(T)*	51	96.2	2	3.8
Part 4. Post-operative hypothermia prevention					
During the post-operative period, hypothermic patients should be warmed using active warming method until they become warm before transferring them to the ward.	(T)*	52	98.1	1	1.9
Patients should be provided with at least 1 cotton sheet, 2 blankets or a duvet during the postoperative phase**.**	(T)*	51	96.2	2	3.8
Whiles in the theatre, the patients' temperature should be measured every 15 minutes and every 30 minutes whiles in the recovery room.	(F)**	8	15.1	45	84.9
It is not necessary to keep patient warm in the emergency unit & the ward since the patient was warmed in the theatre.	(F)**	40	75.5	13	24.5
The temperature of post-operative patients should be recorded on arrival to the ward and be taken and documented as part of a routine four hourly observations.	(T)*	52	98.1	1	1.9

(T)*- True statement (F)- False statement**

Table 4.2 shows the awareness of nurses on perioperative hypothermia prevention. With regards the general knowledge of nurses on perioperative hypothermia prevention, most nurses had the correct answer (8 out of 8) items. Among the statements, 98.1% of nurses choose the most frequent correct answer to the statement "The internal environment of humans can be maintained by thermoregulation" (T) whiles 56.6% of the nurses gave the least frequent correct answer to the statement "Forced-air warming devices, warm water circulating devices and conductive devices are not some of the devices for warming surgical patients" (F).

With regards to the statements on preoperative hypothermia prevention, most nurses had the correct answer (5 out of 5) items. The majority of nurses (94.3%) of nurses answered the most frequent correct answer to the statement "Special attention should be given to the comfort of surgical patients having difficulties to express themselves" (T) whiles 75.5% of the respondents got the least frequent correct answer to the statement "Except in urgent circumstances, preoperative patients with temperatures of less than 36.0°C should be warmed for 30 minutes using active warming methods" (T).

Regarding intraoperative hypothermia prevention, the majority of nurses answered all the statements correctly (6 out of 6). Most nurses (96.2%) gave the most frequent correct answer to the statements "The surgical patient should be well covered throughout surgery to conserve heat and only be exposed during surgical preparation" (T) and "Fluid warming devices should be used to warm Intravenous fluids (500mls or more) & blood products to 37°C" (T). Moreover, 71.7% of the participants gave the less frequent correct answer to the statement "Thermostats-controlled cabinet to temperature of 33° C to 40° should not be used to warm Irrigation fluids".

With regards to the post-operative hypothermia prevention, majority of nurses answered correctly (4 out of 5) items. “During the post-operative period, hypothermic patients should be warmed using active warming method until they become warm before transferring them to the ward” (T) and “The temperature of post-operative patients should be recorded on arrival to the ward and be taken and documented as part of a routine four hourly observations” (T), 98.10% of the respondents gave the most frequent correct answer. However, only 15.1% of nurses gave the less frequent correct answer to the statement “Whiles in the theatre, the patients’ temperature should be measured every 15 minutes and every 30 minutes whiles in the recovery room”. (F).

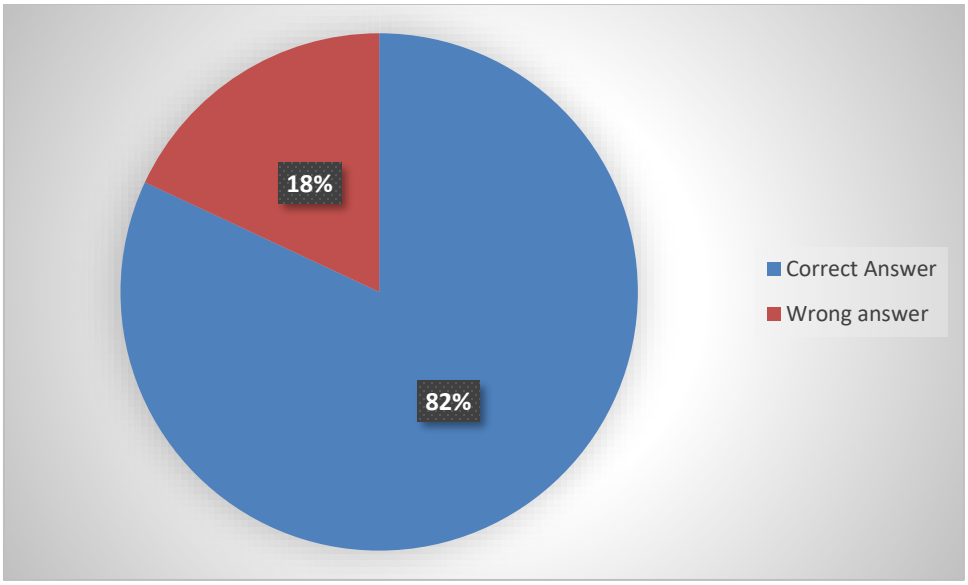

Figure 4. 1. Nurses awareness of perioperative hypothermia prevention

The figure above shows the awareness of nurses on perioperative hypothermia prevention. The majority of the nurses (82%) have a good level of knowledge on perioperative hypothermia prevention. (Figure 4.1).

Table 4.3 Practices of the nurses regarding perioperative hypothermia prevention (N=53)

Questions on perioperative hypothermia prevention practices (N=53)	Always		Sometimes		Never	
	N	%	N	%	N	%
Do you monitor and record patients' temperature readings regularly?	34	64.2	18	34.0	1	1.9
Do you maintain ambient room temperature?	22	41.5	18	34.0	13	24.5
Do you develop and implement care plan on perioperative hypothermia prevention?	14	26.4	36	67.9	3	5.70
Do you include thermoregulation interventions and patient related care to thermoregulation in your hand-over report?	14	26.4	28	52.8	11	20.8
Do you assess patients for their risk for perioperative hypothermia?	12	22.6	22	41.5	19	35.8
Do you advise patients to inform you when they feel cold during their hospitalization?	11	20.8	21	39.6	21	39.6
Do you advise patients to stay warm prior to surgery?	4	7.5	20	37.7	29	54.7
Do you document the site for temperature measurement in the patients file?	3	5.7	20	37.7	30	56.6
Do you communicate your assessment findings on factors that could lead to perioperative hypothermia to all members of the perioperative team?	3	5.7	8	15.1	42	79.2
Do you warm intravenous, blood products and irrigation fluids using special warming devices before administering to patients?	2	3.8	46	86.8	5	9.4
Do you use active or passive warming methods to warm patients?	1	1.9	37	69.8	15	28.3
Do you use forced-air warming devices, warm water circulating devices and conductive devices for warming surgical patients?	0	0.0	2	3.8	51	96.2

Table 4.3 shows the practices of nurses regarding perioperative hypothermia prevention. Results of the study showed that, 64.2 % chose the most frequent always practices to the question

"Do you monitor and record patients' temperature readings regularly? Whiles none of the nurses chose the less frequent always practice to the question "Do you use forced-air warming devices, warm water circulating devices and conductive devices for warming surgical patients?".

Table 4.4 Mean scores of the awareness and practices of the nurses on perioperative hypothermia prevention. (N=53)

Awareness and practices of the nurses on perioperative hypothermia prevention	**Total numbers of the items**	**Mean scores of the correct / always answers**	
		Mean	**SD**
Domains of the awareness			
General knowledge	8	6.3	1.2
Perioperative hypothermia prevention	5	4.3	0.9
Intraoperative hypothermia prevention	6	5.3	0.9
Post-operative hypothermia prevention	5	3.8	0.5
Overall knowledge	24	19.6	2.4
Practice	12	2.3	1.5

Table 4.4 shows the mean and standard deviation of the correct answers on awareness and always practices of nurses on perioperative hypothermia prevention. With regards to the domains of perioperative hypothermia prevention, the general knowledge of nurse's domain had the highest mean of 6.3 (±1.2) whiles the post-operative hypothermia domain had the smallest mean of 3.8 (±0.5). The overall mean value for the knowledge of nurses was 19.6 (±2.4). The mean for always practice was 2.3 (±1.5).

Table 4.5 Correlation between overall awareness correct answers scores and practice scores of the nurses

Correlations			
Awareness score and practices scores		**Overall correct answer awareness score**	**Practice score**
Overall correct answer awareness score	Pearson Correlation	1	-0.256
	Sig. (2-tailed)		**0.064**
	N	53	53
Practice score	Pearson Correlation	-0.256	1
	Sig. (2-tailed)	0.064	
	N	53	53

The Pearson correlation test result showed that there was no statistically significant relationship between overall correct answer awareness score and practice score ($r = 0.064$, $p>0.05$).

Table 4.6 Comparison of the descriptive characteristics and overall awareness correct answer mean scores of the nurses on perioperative hypothermia prevention. (N=53)

Characteristics	Overall knowledge means scores (SD)	P values
Age groups		
<= 25	18.1 (±2.7)	**0.03**
26-30	19.0 (±2.4)	
>=31	21.0 (±2.0)	
Gender		
Male	20.0 (±2.7)	0.57
Female	19.5 (±2.4)	
Educational levels		
Enrolled nursing diploma	18.5 (±2.6)	0.61
Registered nursing diploma	19.9 (±1.7)	

Bachelor's degree	19.7 (±2.7)	
Working experience		
<= 5	18.9 (±2.3)	0.05
6-10	21.1 (±1.9)	
>=11	19.0 (±0.0)	

T-test was done to find the means and standard deviations whiles oneway ANOVA was used to calculate the p-values.

Table 4.6 shows the comparison of the descriptive characteristics and overall knowledge mean scores of the nurses on perioperative hypothermia prevention. The results showed that differences in age groups were statistically significant ($p<0.05$) with the greater than or equal to 31 age group categories being the highest.

Table 4.7 Comparison of the descriptive characteristics and overall practice mean scores of the nurses on perioperative hypothermia prevention. (N=53)

Characteristics	Overall always practice means scores (SD)	P values
Age groups		
<= 25	2.0 (±1.3)	0.73
26-30	2.4 (±1.6)	
>=31	2.1 (±1.4)	
Gender		
Male	2.0 (±1.3)	0.48
Female	2.3 (±1.5)	
Educational levels		
Enrolled nursing diploma	2.0 (±1.8)	0.65
Registered nursing diploma	2.0 (±1.0)	

Bachelor's degree	2.4 (±1.6)	
Working experience		
<= 5	2.4(±1.5)	**0.01**
6-10	1.8 (±1.0)	
>=11	6.0 (±0.0)	

T-test was used to find the means and standard deviations whiles oneway ANOVA was used to calculate the p-values.

Table 4.7 shows the comparison of the descriptive characteristics and overall practice mean scores of the nurses on perioperative hypothermia prevention. The results demonstrated that differences in working experience were statistically significant ($p<0.05$) with greater than or equal to 11 years being the highest.

5. DISCUSSION

Preventing perioperative hypothermia is crucial for the prevention of negative outcomes such as coagulopathy, increased transfusion demands, surgical site infection, impaired medication synthesis, extended healing and thermal disturbance among surgical patients (Sessler, 2016). However, there is little information regarding nurse's awareness on perioperative hypothermia despite vast studies on both inadvertent hypothermia and forced-air warming. This descriptive cross-sectional study was carried out to assess the awareness and practice of nurses on perioperative hypothermia prevention. The study was carried out on 53 nurses working at the Edward Francis Teaching Hospital (EFTH).

Results of the study showed that, majority of nurses (82%) choose the correct answer and only few (18%) choose the wrong answer regarding preventing perioperative hypothermia. The overall knowledge was 19.6(±2.4) (total 24 items). This therefore means that nurses have a high level of awareness and knowledge on perioperative hypothermia prevention. This is in line with (NICE, 2008; AORN, 2016) perioperative hypothermia prevention guidelines. The result of our study disagrees with the findings of the study by Ireland et. al, 2006 on nurses and medical personnel working at a single trauma unit in Australia evaluating their awareness and understanding of unintended hypothermia and its impact on trauma patients in which nurses had limited knowledge regarding perioperative hypothermia (Ireland et. al, 2006). Nurses play a major role in the identification of individual's risk for hypothermia, temperature monitoring throughout the perioperative cycle, utilization of preventive strategies and appropriate warming methods. For this reason, nurses' awareness on perioperative hypothermia is paramount to the prevention and management of hypothermia (Hudgins, 2019). Results of the current study also showed that more than half of the participant said to need training on perioperative hypothermia. Awareness of the

nurses about their knowledge needs is important for their improvement. AORN also recommends that nurses receive training on unintended perioperative hypothermia (AORN, 2018).

Detailed evaluation of the awareness of the nurses on perioperative hypothermia prevention domains including general, preoperative, intraoperative and postoperative hypothermia prevention showed that, there are satisfying levels of awareness in all domains. The findings regarding the general knowledge domain of nurses on perioperative hypothermia prevention were satisfying with the mean score of 6.3 (±1.2) in total 8 items. In this domain, nurses had the most frequent correct answer to the statement "The internal environment of humans can be maintained by thermoregulation" (T),". It is seen in literatures that thermoregulation is responsible for ensuring optimal organ and enzymatic function. Anesthesia is known to destabilize normal thermoregulation mechanism and when coupled with exposure of surgical patients to cold environment, it can lead to hypothermia and hypothermia is associated with post-operative complications such as infection, bleeding, cardiac events and changes in drug metabolism, patient discomfort and increased length of hospital admission. (McSwain et. al, 2015). It is satisfying to know that nurses had robust basic knowledge of the physiology of thermoregulation which is a crucial factor for the prevention and management of hypothermia in surgical patients. Nurses also gave the least frequent correct answer to statement "Forced-air warming devices, warm water circulating devices and conductive devices are not some of the devices for warming surgical patients" (F). The result of a meta-analysis on the effectiveness of forced-air warming devices for the prevention of perioperative hypothermia in surgical patients showed that forced-air warming is more effective in the prevention of perioperative hypothermia than passive insulation and circulating-water mattresses, however when forced air warming devices were compared with circulating-water garments, resistive heating blankets and radiant warming systems, the results showed no statistically significant difference

(Nieh & Su, 2016). As seen from the result of the above meta-analysis, forced air warming devices, warm water circulation devices and radiant / conductive devices are crucial for the prevention and warming of surgical patients. However, it is disappointing to note that most of the participants had little knowledge about warming devices. This stresses the need for education on perioperative hypothermia preventive measures/devices.

With regards to the statements on preoperative hypothermia prevention domain, nurses had correct answer mean score of 4.3 (±0.9) (total 5 items) which in overall is good. In this domain, nurses had the most frequent correct answer to the statement "Special attention should be given to the comfort of surgical patients having difficulties to express themselves" (T). Patients' with the inability to express themselves may not contribute or adhere to teachings when being prepped for surgery. Surgical patients should be thoroughly assessed to identify communication barriers and implement certain communication techniques to counter this effect. It is indeed very satisfying to note that the majority of nurses are aware of the need to pay special attention to patients with inability to express themselves when prepped for surgery. This in line with NICE, 2008 guideline of perioperative hypothermia prevention. More than half of the respondents also gave the least frequent correct answer to statement "Except in urgent circumstances, preoperative patients with temperatures of less than 36.0°C should be warmed for 30 minutes using active warming methods" (T) which is fairly good however, the remaining quarter of nurses got it wrong. The result of a systematic review on the role of perioperative warming in surgery showed that warming surgical patients perioperatively was effective in mitigating wound pain, wound infection and shivering. Warming of surgical patients was also associated with less perioperative blood loss by preventing hypothermia-induced coagulopathy (Sajid et. al, 2009).

Regarding intraoperative hypothermia prevention domain, the majority nurses had correct answer mean score of 5.3 (±0.9) (total 6 items) which in overall is good. In this domain, nurses had the most frequent correct answer to the statements "Fluid warming devices should be used to warm Intravenous fluids (500mls or more) & blood products to 37°C" (T) and "The surgical patient should be well covered throughout surgery to conserve heat and only be exposed during surgical preparation" (T). Warming intravenous fluids & blood products before administering to patients and will help maintain normothermia, protecting them from harmful negative consequences associated with hypothermia. Also, covering patients during the perioperative cycle will help to prevent heat loss and maintain normothermia. This is in line with the NICE,2008 perioperative hypothermia prevention guideline. Moreover, our results showed that nurses' least correct answer was regarding "Thermostats-controlled cabinet to temperature of 33° C to 40° should not be used to warm Irrigation fluids" (F). Thermostat controlled cabinet is a device used to warm irrigation fluids. It is unsatisfying to note that more than a quarter of the nurses had no knowledge about it. It is therefore important to introduce and train nurses about the use of the aforementioned device.

With regards to the post-operative hypothermia prevention, the majority nurses had correct answer mean score of 3.8 (±0.5) (total 5 items) which in overall is good. In this domain, nurses had the most frequent correct answer to the statements "During the post-operative period, hypothermic patients should be warmed using active warming method until they become warm before transferring them to the ward" (T), and "The temperature of post-operative patients should be recorded on arrival to the ward and be taken and documented as part of a routine four hourly observations" (T). It is satisfying to note the majority of nurses demonstrated good knowledge on active warming devices and the frequency of temperature measurement during this phase of the perioperative cycle. This is however with the AORN, 2016 & NICE, 2008 perioperative

hypothermia prevention guideline. Moreover, our results showed that nurses' least correct answer was regarding the statement "Whiles in the theatre, the patients' temperature should be measured every 15 minutes and every 30 minutes whiles in the recovery room" (F). It is very disappointing to note that majority nurses had wrong knowledge about the frequency of temperature measurement at the theatre and the recovery room. This is contrast with the NICE, 2008 perioperative hypothermia guideline which recommends that surgical patients' temperature be measured every 30 minutes whiles in theatre and every 15 minutes whiles in the recovery room.

With regards to the practices of nurses on perioperative hypothermia prevention, out of the twelve items nurses had a mean correct/always practice score of 2.3 (±1.5) (total 12 items). A majority of the participants chose the "never" answer for the statements "Do you use forced-air warming devices, warm water circulating devices and conductive devices for warming surgical patients?", "Do you use forced-air warming devices, warm water circulating devices and conductive devices for warming surgical patients?", "Do you document the site for temperature measurement in the patients file?" and "Do you advise patients to stay warm prior to surgery?" respectively. The result of a systematic review on the effectiveness of prewarming to prevent perioperative hypothermia showed that using force-air warming devices were effective in reducing hypothermia when used for warming surgical patients (Poveda et. al, 2012). The result of the study also showed that most nurses had "sometimes" answers for "Do you warm intravenous, blood products and irrigation fluids using special warming devices before administering to patients?", "Do you use active or passive warming methods to warm patients?", "Do you develop and implement care plan on perioperative hypothermia prevention?" and "Do you include thermoregulation interventions and patient related care to thermoregulation in your hand-over report?" items respectively. These findings are in contrast with the AORN, 2016 & NICE, 2008

guidelines for perioperative hypothermia prevention. As shown by the overall always practice score, majority of the nurses demonstrated poor practice regarding perioperative hypothermia prevention. This poor outcome might be due to the non-existence of clinical practice guideline or absence of forced air warming devices at the Edward Francis Teaching Hospital (EFTH). Forced air warming devices are indeed crucial for the prevention and management of perioperative hypothermia. This was shown from the result of a systematic review and meta-analysis on the efficacy of air- free warming systems on perioperative hypothermia in total hip and knee arthroplasty showed that air-free warming system was as efficient as forced air warming system in patients undergoing joint arthroplasty. (Liu et.al, 2019).

Comparing the overall awareness correct answers score and practice scores of the nurses, showed no statistically significant difference ($p>0.05$). This means that an increase in awareness will not translate into practice. The result of our study showed that nurses had a good knowledge but demonstrated bad perioperative hypothermia prevention practice behaviors. This could be due to inexperience, absence of perioperative hypothermia guidelines, absence or malfunctioning temperature measuring & warming devices. The devices might be available but the nurses may not be able to operate them. As shown from a study on 139 nursing staff from a general hospital in the United Kingdom on the practice and awareness of nurses with regards to temperature monitoring of patients showed that nurses had a poor level of awareness and practice in the use of infrared tympanic thermometry (IRTT) to monitor patients' temperature levels (Evans & Kenkre, 2006). It is therefore necessary to train nurses about the prevention and management of perioperative hypothermia.

The result of the study comparing the descriptive characteristics and the overall knowledge mean scores of the nurses on perioperative hypothermia prevention showed that difference in the

age group were statistically significant ($p<0.05$). The greater the age the higher the overall knowledge mean score than the others. The findings of the study comparing the descriptive characteristics and overall practice mean scores of the nurses on perioperative hypothermia prevention demonstrated that differences in working experience were statistically significant with greater than or equal to 11 years being the highest. Years of nursing experience was determined to be a significant factor affecting nurses' awareness and practice. This means that the higher the experience the greater the knowledge. Since the majority of nurses have less than or equal to 5yrs working experience it is crucial that they undergo training on perioperative hypothermia prevention. Perioperative hypothermia prevention is neither difficult nor expensive. Effective preventive measures can help mitigate the risk of the negative consequences associated with perioperative hypothermia and eradicate unnecessary pain & discomfort to patients. Young & Watson, (2006).

6. CONCLUSION

The results of this study showed that nurses had a high level of awareness/knowledge of perioperative hypothermia prevention. This is however not translated into practice. This may be due to an absence of guidelines, active and passive warming devices and inadequate training on perioperative hypothermia prevention. Preventing perioperative hypothermia is a main patient safety concern of perioperative nurses (Steelman, Graling & Perkhounkova, 2013). Therefore, members of the perioperative team should receive training on hypothermia preventive practices. (AORN, 2016). Up to date perioperative hypothermia guidelines such as the NICE,2008; AORN,2016 should be implemented to help prevent and manage perioperative hypothermia. Nurses should work with other healthcare personnel throughout the perioperative cycle in order to help mitigate if not eradicate inadvertent perioperative hypothermia which would result in improved outcomes for their patients.

7. FINDINGS AND RECOMMENDATIONS

7.1 Findings

The main findings of the study with the aim of determining the awareness and practices of nurses on perioperative hypothermia prevention are as follow:

- A total of 53 nurses participated in this study. The majority were female (77.4%) and the mean age of the nurses was 29.9 years. The majority of nurses had less than or equal to 5 years working experience. More than half of the participants had bachelor degree (66.0%), 17% of them work at the maternity unit and orthopedic ward. The majority of the nurses stated that they have not received training on perioperative hypothermia prevention (67.3%). A 43.80% of the nurses have received a training on perioperative hypothermia prevention from school. Most nurses said to need training on perioperative hypothermia (66.0%). (Table 4.1).
- Regarding the general knowledge, perioperative hypothermia, Intraoperative hypothermia & post-operative hypothermia prevention, most nurses had the correct answer (8 out of 8) items, (5 out of 5) items, (6 out of 6) items and (4 out of 5) items respectively. (Table 4.2).
- The majority of the nurses have a good level of knowledge on perioperative hypothermia prevention. (82%). (Figure 1).
- With regards to the reported practice of nurses. Majority of nurses had “never” and “sometimes” answers for (4 out 12) items. (Table 4.3).
- Comparing the overall awareness correct answers score and practice scores of the nurses, the result showed no statistically significant difference ($p>0.05$). (Table 4.4).

- The result of the study comparing the descriptive characteristics and the overall knowledge mean scores of the nurses on perioperative hypothermia prevention showed that difference in the age groups were statistically significant ($p<0.0.5$). (Table 4.5).
- The findings of the study comparing the descriptive characteristics and overall practice mean scores of the nurses on perioperative hypothermia prevention demonstrated that differences in working experience were statistically significant ($p<0.05$). (Table 4.6).

7.2 Recommendations

Based on the findings of this study the following recommendations were made;

- Standard up to date perioperative hypothermia guidelines such as the NICE,2008 & AORN,2016 should be implemented to help prevent and manage perioperative hypothermia.
- Nurses should be provided with the opportunity to attend perioperative hypothermia workshop or in-service training in order to enhance their knowledge and promote good perioperative hypothermia practices.
- The hospital management should introduce warming devices, develop policies on perioperative hypothermia prevention and provide updated information on perioperative hypothermia prevention techniques to nurses.
- Carry out more studies on nurses to evaluate their compliance with the policies put in place to prevent perioperative hypothermia.

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APPENDIX I

Nurses' information sheet

Dear Respondent,

I will be very grateful if you will take your time to participate in this survey. The survey aims to assess your awareness and practices with regards to perioperative hypothermia prevention.

You have been identified as one of the participants to respond to the questionnaires used in this research work and however you are free to withdraw at any time you deem necessary.

I encourage you to ask any question that is not clear enough to you; please feel free to answer the questions accordingly without withholding any vital information that may be of great help. I assure you that the information you provide will be treated as highly classified confidential document. Your identity is well protected because the information you provide on this questionnaire will not be shared with your colleagues.

Thank you for your participation.

Consent form

I have read and understood the information sheet provided above and the explanation given by the researcher. I hereby voluntarily consent to participate in the research.

Participant Witness

Signature Signature

A. Socio-demographic characteristics of study participants

1. Gender: □ Male □ Female
2. Age: _____
3. Educational level: _____
4. Working experience in years: _____
5. Ward: _____
6. Did you receive any training on perioperative hypothermia prevention? Yes □ No □
7. (If you answered the question 7 as "yes") What was the educational source?
   a. School
   b. In-service education
   c. Courses, congress etc.
   d. Online references

e. Other (Please explain)

8. Do you need education regarding perioperative hypothermia prevention? Yes □ No □

B) PERIOPERATIVE HYPOTHERMIA QUESTIONNAIRE ON AWARENESS

ITEM NO.	STATEMENTS ABOUT PERIOPERATIVE HYPOTHERMIA PREVENTION	TRUE	FALSE	DON'T KNOW
PART 1	**GENERAL KNOWLEDGE**			
1.	The internal environment of humans can be maintained by thermoregulation.	X		
2.	Perioperative hypothermia at any time during the perioperative cycle is characterized as a core body temperature < 35 ° C	X		
3.	Perioperative hypothermia is associated with complications such as changes in drug metabolism, healing complications, shivering, clotting defects, cardiac morbidity and prolonged post-anesthetic recovery.	X		
4.	To minimize surgical complications post-operatively, nurses should advise patients to bring along additional clothing to help them stay warm prior to surgery	X		
5.	The pulmonary artery catheter, distal esophagus, urinary bladder, zero heat-flux are some of the sites for temperature measurements.	X		
6.	Nurses should be well trained and knowledgeable about the use of both temperature recording and warming devices	X		
7.	Forced-air warming devices, warm water circulating devices and conductive devices are not some of the devices for warming surgical patients		X	
8.	The method for temperature monitoring should not be chosen based on the criteria for a procedure		X	
PART 2	**PERIOPERATIVE HYPOTHERMIA PREVENTION**			
1	Patients with a temperature below 36.0°C undergoing anesthesia & those having a high risk of cardiovascular complications are at higher risk for inadvertent perioperative hypothermia	X		
2	It is not necessary to measure patients' temperature in the hour before departing the ward since it will be measured at the theatre.		X	
3	Except in urgent circumstances, preoperative patients with temperatures of less than 36.0°C should be warmed for 30 minutes using active warming methods.	X		
4	Special attention should be given to the comfort of surgical patients having difficulties to express themselves	X		

5.	The method for warming surgical patients should be chosen based on the planned surgical procedure, positioning of the patient, Intravenous access site and warming equipment constraints.	X		
PART 3	**INTRAOPERATIVE HYPOTHERMIA PREVENTION**			
1	Critical incidence reporting is not necessary for patients coming into the theatre with a temperature of less than 36.0°C.		X	
2	The theatre's room temperature should be at least 21 ° C which can be adjusted to allow better working once active warming is initiated.	X		
3	Thermostats controlled cabinet to temperature of 33° C to 40° should not be used to warm Irrigation fluids.		X	
4	Fluid warming devices should be used to warm Intravenous fluids (500mls or more) & blood products to 37°C	X		
5	Regardless of the temperatures of patients before leaving the ward or emergency department, they should be warmed using active warming method once in the theatre	X		
6	The surgical patient should be well covered throughout surgery to conserve heat and only be exposed during surgical preparation.	X		
PART 4	**POST-OPERATIVE HYPOTHERMIA PREVENTION**			
1	During the post-operative period, hypothermic patients should be warmed using active warming method until they become warm before transferring them to the ward.	X		
2	Patients should be provided with at least 1 cotton sheet, 2 blankets or a duvet during the postoperative phase	X		
3	Whiles in the theatre, the patients' temperature should be measured every 15 minutes and every 30 minutes whiles in the recovery room.		X	
4	It is not necessary to keep patient warm in the emergency unit & the ward since the patient was warmed in the theatre.		X	
5.	The temperature of post-operative patients should be recorded on arrival to the ward and be taken and documented as part of a routine four hourly observations.	X		

X-represent correct answers

C) PERIOPERATIVE HYPOTHERMIA QUESTIONNAIRE ON PRACTICES

Please state your opinion about the following by marking the alternatives ranging between "Always", "Sometimes", "I don't have any information on this subject", "Never" with an explanation when necessary.

HYPOTHERMIA PREVENTION PRACTICES	ALWAYS	SOMETIMES	NEVER	EXPLANATION
1. Do you warm intravenous, blood products and irrigation fluids using special warming devices before administering to patients?				
2. Do you use active or passive warming methods to warm patients?				
3. Do you use forced-air warming devices, warm water circulating devices and conductive devices for warming surgical patients?				
4. Do you communicate your assessment findings on factors that could lead to perioperative hypothermia to all members of the perioperative team?				
5. Do you advise patients to inform you when they feel cold during their hospitalization?				
6. Do you develop and implement care plan on perioperative hypothermia prevention?				
7. Do you monitor and record patients' temperature readings regularly?				
8. Do you document the site for temperature measurement in the patients file?				
9. Do you maintain ambient room temperature?				
10. Do you assess patients for their risk for perioperative hypothermia?				
11. Do you advise patients to stay warm prior to surgery?				
12. Do you include thermoregulation interventions and patient related care to thermoregulation in your hand-over report?				

Appendix II

YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 23.04.2020
Toplantı No : 2020/78
Proje No :1036

Yakın Doğu Üniversitesi Hemşirelik Fakültesi öğretim üyelerinden Prof. Dr. Nurhan Bayraktar'ın sorumlu araştırmacısı olduğu, YDU/2020/78-1036 proje numaralı ve "Nurses' awareness and practices regarding perioperative hypothermia prevention" başlıklı proje önerisi kurulumuzca online toplantıda değerlendirilmiş olup, etik olarak uygun bulunmuştur.

Prof. Dr. Rüştü Onur
Yakın Doğu Üniversitesi
Bilimsel Araştırmalar Etik Kurulu Başkanı

Appendix III

EFSTH

Edward Francis Small Teaching Hospital

THE REPUBLIC OF THE GAMBIA

Medical Advisory Committee (MAC)

Date: 1/6/2020

Attn: ~~Dr~~/ Mr/ ~~Mrs~~/ ~~Miss~~ /~~Ms~~: OUSMAN JALLOW

#20185305

Supervisor/Collaborator: DCM1 Sister Haddy Lemon

Research Title: Nurses Awareness and Practices Regarding Perioperative Hypothermia Prevention

Attn: HoD/ Chief Matron/Matron: **THEATRES and SURGICAL WARDS**

RE: APPROVAL TO CARRY OUT RESEARCH IN EFSTH

I write to inform you that conditional approval has been granted for you to proceed on your research as requested.

The conditions are that during the course of your project, you are to work under the supervision of or in conjunction with a named senior person in the main department(s) in which you plan to undertake your research. You are to conform to all the rules and regulations as well as ethical principles of the Hospital. Any breach of these conditions may result in withdrawal of your approval.

You are required to submit a copy of your final project to this committee for use in the Hospital Library and any data collected is jointly owned by the hospital.

I wish you success in your research project.

Thank you.

Dr Kebba S. Marenah
For: Research and Ethics Committee

CURRICULUM VITAE

Name	Ousman	Surname	Jallow
Place of Birth Date	The Gambia 25\07\1993	Tel	+905338522891
Nationality	Gambian		
E-mail	ojallow282@aiu.edu.gm		

Educational Level

	Name of the Institution	Graduation year
Masters	Near East University	Till Date
Undergraduate	American International University West Africa	2017
High school	St. Paul's Senior High school	2013

Job experience

Duty	Institution	Duration (Year-Year)
Assess patient condition, review and analyze medical history and lab values. Verify physician orders and patient consent authorizations. Draw blood for Routine labs (FBC, MALARIA and BM) Perform peripheral IV cannula insertions for hydration and medication. Document all conditions, procedures and test results via records systems Maintain crash carts, defibrillators and emergency equipment and supplies. Activate codes and manage	Africmed Clinical Services	2017-2019

medical emergencies until physician arrives. Update patient families on progress. Performed discharge procedures, prepared patients for transport, accessed community resources; conducted patient education. Trained incoming nurses on hospital policies and procedures; supported and oversaw through learning periods. Provided expertise to all staff for complex issues. Perform ECG for outpatient and inpatients as per doctor`s request. Liaise with other nursing colleagues to ensure appropriate and effective nursing care delivery during shift Rota. Assist in preparing invoices for clients accordingly. Participate in emergency ambulance service		

Foreign Languages	**Reading comprehension**	**Speaking***	**Writing***
English	Very good	Very good	very good
Turkish	Good	Good	Good
French	Good	Very good	Good

Computer Knowledge

Program	**Use proficiency**
Microsoft Office	Very good
SPSS	good