ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

MAGNITUDE AND ASSOCIATED FACTORS OF INTRA-OPERATIVE HYPOTHERMIA AMONG PEDIATRIC PATIENTS UNDERGOING ELECTIVE SURGERY AT SELECTED PUBLIC HOSPITALS, ADDIS ABABA, ETHIOPIA, 2021.

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A THESIS TO BE SUBMITTED TO DEPARTMENT OF ANESTHESIA, SCHOOL OF MEDICINE, COLLEGE OF HEALTH SCIENCES ,ADDIS ABABA UNIVERSITY FOR PARTIAL FULFILLMENT OF THE REQUIREMENT FOR MASTER OF SCIENCE IN CLINICAL ANESTHESIA.

June, 2021

Addis Ababa, Ethiopia

Addis Ababa University

College of Health Sciences

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Title of research	MAGNITUDE AND ASSOCIATED FACTORS OF INTRA-OPERATIVE HYPOTHERMIA AMONG PEDIATRIC PATIENTS UNDERGOING ELECTIVE SURGERY AT SELECTED PUBLIC HOSPITALS, ADDIS ABABA, ETHIOPIA, 2021.
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Declaration

I, undersigned, declare that this thesis is my original work in the partial fulfillment of the requirement for Master of Science in clinical anesthesia. I understand that plagiarism will not be tolerated and all directed quoted material has been appropriately referenced.

Name _____

Signature_____

Submitted to; MSC Tutors, Department of anesthesia Addis Ababa University

Date of submission: _____

This thesis work has been submitted for examination with my approval as advisors and Tutors on the Master of Science in anesthesia.

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External Examiner

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Abbreviation and Acronyms

AOR Adjusted odd ratio

ASA American Society of Anesthesiologists

BSA Body Surface Area

BSC Bachelor of Science

C.I Confidence interval

COR Crude odd ratio

ENT Ear Nose Throat

ETB Ethiopian Birr

GA General Anesthesia

GIT Gastrointestinal Tracts

GUH Gonder University of Hospital

IV intravenous

MSc Master of Science

OR Operation Room

PACU Post Anesthesia Care Unit

SPMH St. Paul Millennium

SPSS Statistical Package for Social Sciences

TASH Tkur Anbesa specialized Hospital

ZPMH Zewditu Memorial Hospital

Abstract

Back Ground: Hypothermia defined as a core body temperature less than 36 c^0. It is a frequent condition encountered in pediatric patients operated under general anesthesia. It is one of the common event during surgery &can have different consequences that increase perioperative morbidity & mortality.

Objective: To assess magnitude and associated factors of intra-operative hypothermia among pediatric patients undergoing elective surgery at selected public hospitals in Addis Ababa, Ethiopia from February - April, 2021.

Method: Institutional based cross sectional study was conduct on 339 pediatric patients undergoing elective surgery at public hospitals in Addis Ababa, Ethiopia from February - April, 2021. Study participants were selected by systematic random sampling technique. The data collection procedure was Chart review and intra -operative temperature measurement &collected data were analyzed by SPSS version 26. The Independent variables, were analyze using binary &multi logistic regression. Odds ratio, 95% confidence interval, and p-value of <0.05 were consider as cutoff point to tested for statistically significant and to determine the strength of the association.

Result: The magnitude of intra-operative hypothermia in this study was 39.8%.Room temperature less than $26c^0$ (AOR=6,95%CI,2.859,13.23),volume of fluid administered greater than half liter (AOR=3.6,95%CI,1.83,7.23), Patients who were received un-warm fluid(AOR, 2.2, 95%CI, 1.28,4.04) and duration of surgery and anesthesia time greater than 120 minute(AOR=3.4,95%CI,1.29,8.79) and (AOR=3.8,95%CI,1.25,11.53) Respectively were factors which was significantly associated with intra-operative hypothermia.

Conclusion & Recommendation: This study revealed that high magnitude of intra-operative hypothermia among pediatric patients. Room temperature less than $26c^0$, unwarm fluid Administered, volume of fluid administered greater than half liter, duration of surgery and anesthesia time were significantly associated with intra-operative hypothermia.

I would like to advice for anesthetist to use warm intra-venous fluid & maintaining of Room temperature above $26c^0$ &the public healthy planner advised to set means of prevention of hypothermia based on this study.

Key words: Hypothermia, Intra-Operative, Magnitude, Risk Factor, Ethiopia

Chapter One: Introduction

1.1 .Background

Hypothermia defined us a core body temperature less than $36c^0$. It is a frequent condition encountered in pediatric patients operated under general anesthesia(1).Body temperature regulation is a type of homeostasis, which regulated the biological systems to preserve a stable internal core temperature in order to survive. Maintaining normothermia during surgery is important not only for patient comfort but also for prevention of complication resulting from hypothermia(2).

Human body core temperature is one of the fifth vital sign and approximately 36.5°C–37.5°C is the mean core temperature of a healthy human that require a constant internal body temperature to maintain an optimal function of each organ system and to prevent any disorder result from hypothermia(3). Normal core body temperature varies with in 1-2°C based on circadian and menstrual cycles. But at any time, core body temperature is tightly regulated during day time &more variation at night(4).

Pediatric age group are high risk for hypothermia due to easily heat loss than adult children because they have higher surface area to volume ratio, immature hypothalamic thermo regulatory capacity and less insulating subcutaneous tissue (5,6). In pediatric age group prevention of hypothermia , not by vasoconstriction and shivering rather they use non-shivering thermogenesis mechanism of brown fat adipose tissue broken down for heat production but this mechanism will impair during under anesthesia(7).

During induction of anesthesia and surgery redistribution of temperature from central to peripheral tissue results hypothermia due to internal heat loss, this results coagulopathy, transfusion requirement delaying drug metabolism and prolonged recovery(8). Hypothermia during anesthesia occurs due to a combination of anesthetic-induced impaired thermoregulation center ,inhibition of normal response to heat loss, cooling effect of cold anesthetic gases, reduced body heat production due to reduced metabolic rate and increase heat loss to the environment when body cavity opened during surgery to cold operation room environment (9).

Intra operative hypothermia happen after induction of anesthesia due to heat loss to the surrounding area during surgery by four mechanism ,the first and highest means of heat loss commonly happen in operation room is radiation which account 50-70%,the second means heat loss is convection which account is 15-25%,the third means of heat loss is evaporation which account 5-15% ,and the last means of heat loss is conduction which account 3-5%(10).

Intraoperative measurement of body temperature help to detect intra operative hypothermia ,malignant hyperthermia and also helps to accurate determination of core body temperature and efficacy of various warming technique and to evaluate thermoregulatory effect of different anesthetic agents(11).

1.2 .Statement of the problem

Intra operative Hypothermia is a common problem that occur during surgery and anesthesia .it affect more than 70% of operated patients in the intraoperative period and it causes intra-operative &postoperative morbidity and mortality(1).The incidence of intraoperative hypothermia in pediatric patient was very high and common. The rate of hypothermia was 17.8%, 36.2%, 42.5% and 44.1% within the 1 h, 2 h, 3 h and 4 hour respectively after induction of anesthesia and following of surgery(12).

One of the major problems in pediatric patients encountered during surgery and anesthesia is intraoperative hypothermia. The incidence of intraoperative hypothermia in pediatric patient was higher than preoperative and postoperative hypothermia and it is associated with a complications of intraoperative bleeding, impaired immune system, wound infection, delayed awakening from anesthesia and cardiac problems (13,14).

In some condition intra operative hypothermia had an effect to reduce myocardial and cerebral ischemia, but recent research results showed that intraoperative hypothermia would have a major consequences with increase intra-operative and post-operative morbidity and mortality(15). A core body temperature of less than 34°C is highly associated with mortality and morbidity due to coagulopathy, metabolic acidosis, multiple organ failure, hemodynamic instability and post-operative infections(16).

Intra-operative hypothermia associated by several factors such as anesthetic agents, operation room temperature, age, American society of anesthesiology(ASA) Class ,systemic chronic diseases, regional block level, intra-operative blood loss, blood transfusion duration and type of surgery and intravenous administration of cold and warm fluids(17).

Various strategies are recommended to minimize the occurrence of intraoperative hypothermia in pediatric patients by using different technique like warming of intra venous fluid ,warming the patient skin by hot clothe, continuous regulating operation room temperature and by others materials without any adverse side effect(18,19).

Despites evidences are limited regarding the magnitude and associated factors of intraoperative hypothermia in pediatric age group in Ethiopia, particularly in Addis Ababa public hospital.

1.3. Significance of the study

Evidences showed that intra operative hypothermia has great impact in intra-operative and post-operative morbidity and mortality(20,21), and in my observation most public hospitals of Addis Ababa this problem is a major problem.

Even though there were some preventive method like warming of intra venous fluid administration ,warming the patient skin by hot clothe and regulating operation room temperature(18,19) but these technique are not apply in clinical practice of most public hospitals.

In most of the public hospitals patients who undergoing surgery anesthetists are not attention about their patient body temperature monitoring. The same way health manager not care any resource related for core body temperature measuring materials in public hospitals.

In addition to this pediatric patients had not enough preventive mechanism like adults and they are high risk for hypothermia due to easily heat loss than adult because they have higher surface area to body ratio, immature hypothalamic thermo regulatory center and less insulating subcutaneous tissue this results patients are easily to lost body heat to the environment. These situations makes pediatric patients risk for intra operative hypothermia and high risk to develop intra-operative and post-operative complications due to hypothermia and it results patient to pay additional cost.

Us we know Ethiopian health care millennium development goal is to reduce the morbidity and mortality of children(22). The cost of managing this complication is a huge burden for our county economy. Therefore, it is an important to conduct this research in our country especially in Addis Ababa public Hospital to identify the magnitude and factor associated with intra-operative hypothermia.

This study also helps for hospital administrators, program planners and policy makers to plan and organized strategies for preventive measures, planer to set local protocols, to prevent and reduce intra operative hypothermia. In addition, this research is used as a baseline data for next studies to be done on similar problems.

Chapter Two: Literature Review

2.1. Temperature measurement and monitoring

The American Society of Anesthesiologists(ASA) standards for basic anesthetic monitoring state that a continuous measurement of temperature for every patient should be apply for every surgical procedure and anesthesia during intra-operative in order to detect variation of temperature from its normal value(23).

NHI-public research literature showed that the most commonly accurate core body temperature measurement site are tympanic membrane, pulmonary artery, distal esophagus, and nasopharynx, which is used to monitor intraoperative hypothermia, prevent overheating, and facilitate detection of malignant hyperthermia(24,25).

When core body temperature measurement sites are not available or convenient, we can used other site which is near to care temperature measurement in clinically like mouth, axillary, bladder, rectum, and skin surface. Each of them has distinct limitations but can be used clinically in appropriate method(26). An esophageal probe is usually the easiest and most reliable method of reliably measuring core temperature in intubated patients and axillary, oral or skin surface temperatures can be substituted for esophageal or nasopharyngeal temperatures during regional anesthesia, and oral temperature is the most reliable and is also the most suitable for monitoring temperature(27).

Digital Axillary thermometer is the most common and easily available instrument in everywhere and every professionals are used commonly for measurement of temperature for every patients. The accuracy of axillary thermometer measurement depends on carefully position of the tip probe to wards to axillary artery & maintain the arm tightly adducted then it can provide accurate measurement of core- temperature by adding 0.4-0.6c^0 us a compensation (28).

2.2. Magnitude of intraoperative hypothermia

Some previous articles showed that magnitude of intra-operative hypothermia can reach up to 70%(1). According to the study conducted in University of Michigan Hospitals and Health Centers, USA in 2010 by Pearce .B et al on perioperative hypothermia in pediatric patients 278 children (52%) develop intraoperative hypothermia and the duration of hypothermia ranged from 5-142 minutes (25 ± 22.8(20).

Prospective observational study conducted in 103 pediatric patients at University teaching hospital of Kigali by Uwimana et al in 2018 magnitude of intra-operative hypothermia was 71.7% .Intraoperative Hypothermia was more common in children and those undergoing longer, invasive procedures and was associated with more significant blood loss and blood transfusion. Preoperatively a warmer was used in 34% of pediatric patients and the incidences of intraoperative Hypothermia after 3 and 4 hours of surgery were 83% and 100%, respectively(17).

A study conducted in 2020 November at Chengdu Women ' s and Children ' s Central Hospital in pediatric patient who undergoing surgery was overall incidence of intraoperative hypothermia was 81.9% The low fresh gas flow anesthesia significantly reduced the odds of hypothermia 149 (87.6%) versus low flow group: 55 (69.6%); $p < 0.01$]. Moreover, the low fresh gas flow anesthesia could reduce the length of hypothermia [104 mints (50, 156) versus low flow group: 30 mints (0,100); $p < 0.01$], as well as elevate the value of lowest temperature for neonates [routine group: 35.1 °C (34.5, 35.7) versus low flow group: 35.7 °C (35.3, 36); $p < 0.01$](29).

Another Study conducted in 2018 at Malaysia university of Malaya, Kuala Lumpur by Lee-Lee Lai et al on pediatric patients who undergoing surgery The overall incidence of intraoperative hypothermia in this study was noted to be high (53.2%) despite active and passive temperature management during surgery was done and the percentage of hypothermia was 83.3% for neonate, is 56.1% for infants, 46.4% for toddlers and 54.4% for older children. About 1.2% of the children developed moderate hypothermia(30).

Study done by Kioko P.M et al ,at Kenyatta national hospital, in 2013 showed that incidence of intra-operative hypothermia in pediatric patients who were underwent general anesthesia was 30% and 30 out of 100 pediatric patients were developed intra-operative hypothermia and 90% of those developing hypothermia were male compared to 63% who remained norm thermic (p = 0.006). Proportionally, more than twice as many hypothermic patients had a caudal block (43% versus 20%, p = 0.016) and received 121ml more of fluid (p = 0.002) compared to the norm thermic group. The patients who became hypothermic tended to be colder at induction of anesthesia (36.6 ± 0.5ºC versus 37.0 ± 0.5ºC, p = <0.0001) but there was no significant difference in the waiting time, time of induction and operation room temperature (31).

Research conducted at University of Gondar referral Hospital by Denu et al. in 2015 the incidence of hypothermia in the general population before induction of anesthesia was 23.4% and the incidence of hypothermia after induction of anesthesia was 30.5% and the overall intra operative hypothermia was 49.7%(16).

2.3 .Associated factors of intraoperative hypothermia

Study in 502 pediatric patients in 2019 at Malaya by Rampal et al. The incidence of intraoperative hypothermia was 46.6%, even though active and passive temperature management were carried out during surgery. Patient's age, body weight, duration of surgery, type of surgery, intraoperative blood loss, type of anesthesia and operating room temperature were the major risk factor to develop intra operative hypothermia(21).

Prospective observational study conducted in 103 pediatric patients at University teaching hospital of Kigali by Uwimana et al in 2018 magnitude of intra-operative hypothermia was 71.7%. Being female patients [COR=1.5(0.39, 6.3)], general anesthesia [COR=3.2(0.2,53.9)], elective surgery[COR=1.12(0.36,3.6)], not using a warmer preoperatively[COR=3.5(1,13,10.9)] and low operating room temperature[COR=1.7(0.07,37.87)] were a contribute factor which associated with intraoperative Hypothermia(17).

In the study conducted in 2012, at Tokyo, Japan by Noriyoshi a patient with high anxiety level had a significantly higher risk to develop intraoperative hypothermia than a patient with low anxiety level. High anxiety level was found in 61 patients (51%), of which 26 (43%) developed

hypothermia during the first hour and 40 (66%) developed hypothermia during the first 2 hours of anesthesia. After adjustment for important covariates, hypothermia in patients with a high anxiety level during the first hour was 2.17 (95% CI, 1.05 - 4.49; p = 0.04) and during the first 2 hours was 1.77 (95% CI, 1.05 - 2.97; p = 0.03)(32).

Study done at university of Texas south western medical center in 2009 by Larry Myers et al intraoperative hypothermia in head and neck surgery is correlated with perioperative consequences Patients who were hypothermic had a significantly higher rate of complications that norm thermic patients (P=.002) and intraoperative hypothermia as a significant independent predictor for the development of early perioperative complications (odds ratio, 5.122; 95% confidence interval, 1.317-19.917) (33) .

Another study in 2019 by Laxmi Shenoy et al. Which is comparative study on co-warming fluid with pre-warming which is found that co- warming is more effective than pre-warming to prevent intraoperative hypothermia during major surgery the study was conducted among 27 patients in each group who completed the study core temperature decreased to <35°C toward the end of surgery in 17 patients in group pre-warming [mean (SD) 34.59 (1.17°C)] and 18 patients in group coaming [mean (SD) 34.31 (1.34°C)]. The incidence of intraoperative hypothermia and the core temperature at the end of surgery were comparable (P = 0.42) (34–36).

Study conduct by Kioko P.M et al in 2013 at Kenyatta national hospital. The incidence of intra-operative core temperature in pediatric patients undergoing general anesthesia was 30%. Gender male (90% of those developing hypothermia were male compared to 63 %(p = 0.006)), lower body temperature at induction (36.6 ± 0.5ºC versus 37.0 ± 0.5ºC, p = <0.0001), use of caudal block (43% versus 20%, p = 0.016) and the volume of intravenous fluids infused (p = 0.002) were significant independent predictors of core hypothermia. The most significant predictor was body temperature at the time of induction of general anesthesia(31).

Research conducted at University of Gondar referral Hospital by Denu et al. In 2015 in all age group patients type of anesthesia used and presence of co-existing illness were found to be factors associated with intra-operative hypothermia. Accordingly the use of General anesthesia increase the incidence of intra-operative hypothermia by more twice as compared to use of spinal anesthesia (AOR=2.3)(16).

Conceptual framework

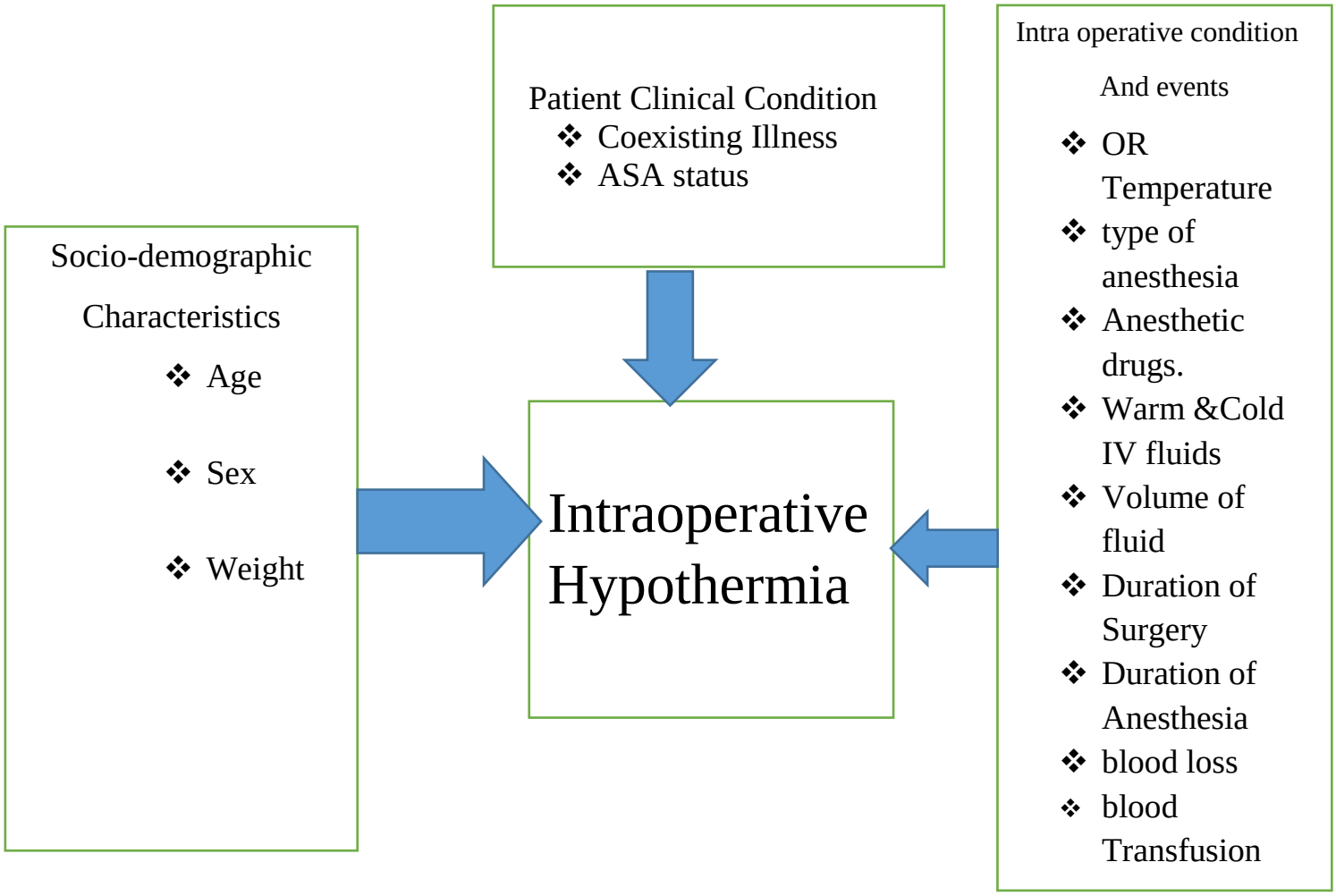

Figure 1-Conceptual framework showing of factors affecting intra-operative hypothermia for patients who underwent elective surgery at TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.

Chapter Three: Objectives

3.1. General Objective

To Assess Magnitude and Associated Factors of Intra-operative Hypothermia among Pediatric Patients Undergoing Elective surgery at public Hospitals of Addis Ababa, Ethiopia, from February1 - April 30, 2021.

3.2. Specific Objective

1. To determine the magnitude of intraoperative hypothermia among pediatric patients operated at selected public hospitals of Addis Ababa.

2. To identify factors associated with intraoperative hypothermia among pediatric patients operated at selected public hospitals of Addis Ababa.

Chapter four: Methodology

4.1. Study Design, and Period:

Institutional based cross sectional study was conduct at selected public hospitals in operating theatre at Addis Ababa, Ethiopia from February - April, 2021.

4.2. Study area:

Addis Ababa, the capital city of Ethiopia with a population of 3,475,952 according to the 2007 population census with altitudes ranging from 2200 to 3000 meter above sea level and average temperature of 22.8°C has 40 hospitals (twelve public and 28 private), 29 health Centers, 122 health stations, 37 health posts and 382 modern private clinics (47).Out of 13 public hospital in Addis Ababa seven of them provide pediatric surgery service those are Black Lion specialized Hospital, Zewditu Memorial Hospital, Yekatit 12 Hospital, ALERT Center, St. Paul Millennium, St. Peter Hospital and Minilik II. The study was conducted from seven hospital .I was selected 4 of them by lottery method and the study was conducted from four hospitals. TASH has 800 beds,15 operation rooms that include 9 in the main operation room, 2 in obstetric unit, 4 in orthopedic department. Minilik II has 135beds, 8 operation rooms that include one pediatric operation rooms, one thoracic operation rooms, and other main operation room. Empress Zewiditu Memorial hospital has a total of 128 beds and 7 operation rooms and from these one operation room for neurosurgery pediatric operation room. St. Paul's Hospital Millennium Medical College has 337 beds 8operation room.

4.3 .Source and study population:

4.3.1 .Source population

All pediatric patients who underwent surgery at all public hospitals of Addis Ababa.

4.3.2. Study population:

All pediatric patients who underwent elective surgery during study period at selected public hospitals of Addis Ababa and fulfill inclusion criteria were included the study.

4.4 .Eligibility criteria

4.4.1. Inclusion criteria

Pediatric patients who were less than 18 years old were underwent elective surgery from February 1- April 30, 2021

4.4.2 .Exclusion criteria:

- patients with body temperature less than 36
- anesthesia time less than 30 minutes
- patient's that have sustained one or more traumatic injuries
- Patients with body temperature greater than 38
- patients who were underwent open heart surgery
- Patients who were refused.

4.5 .Variables

4.5.1. Dependent variables

Intraoperative hypothermia, Yes/No

4.5.2 .Independent variables

- **Socio-demographic variables**

  - Age,
  - sex,
  - weight,

- **clinical condition of the patient**

  - ASA status
  - coexisting medical illness

- **Intraoperative related factors**

❖ Blood transfusion

❖ Volume of blood loss

❖ Type of surgery

❖ type of anesthesia

❖ Induction agents used.

❖ Duration of Anesthesia time

❖ Duration of surgery time

❖ Ambient temperature

❖ Volume of intravenous fluid administered

❖ Warmed fluid administered

❖ Un-warmed fluid administered

4. 6. Operational definitions

Normothermia: A core temperature range of 36°C to 38°C (16,31)

Hypothermia: A core temperature less than 36°C (16,31)

Intra-operative hypothermia defined as temperature of patients less than 36°C that lasted for at least 10 minute(6,37).

Hyperthermia: A core temperature greater than 39°C (16,31)

Radiation: heat transfer from the infant's warm skin to cooler surrounding walls(10).

Conduction: heat transfer to cooler surfaces in contact with the infant's skin(10).

Evaporation: passive transcutaneous evaporation of water from the skin)(10).

Convection: heat loss from the infant's skin to moving air(10).

Pediatric patient: **A** patients whose age less than18 years old(21).

Elective surgery**:** A surgical procedure which is scheduled for advance procedure and is not considered an emergency.

Duration of surgery: I is the time starting from incision of surgery until to the end of surgery

Duration of anesthesia: It is time starting from administration anesthesia until to end of anesthesia

OR: Operating Room: it is a room in a hospital in which surgical operations are performed

ASA physical status classification

ASA Physical Status classification is a grading system simply to assess the degree of a Patient's "sickness" or "physical state" prior to selecting the anesthetic or prior to performing Surgery.

ASA 1 Normal healthy patient

ASA 2 Patients with mild systemic disease

ASA 3 Patients with severe systemic disease

ASA 4 Patients with severe systemic disease that is a constant threat to life

ASA 5 Moribund patients who are not expected to survive without the operation

ASA 6 A declared brain-dead patient whose organs are being removed for donor purposes

ASA E Emergency patient

4.7. Sample size and sampling technique

4.7.1. Sample size

The sample size was determined by taking the following assumption; the magnitude of intra-operative hypothermia in pediatric patients who underwent general anesthesia conducted in 2013 at Kenyatta National Hospital by Kioko P.M et al .Which was 30%(31). Confidence level of 95% and margin of error to be tolerated at 5% (α= 0.05), and 5% non-response rate were used. Therefore, actual total sample size was (n final + 5% non-response rate

Sample size was computed based on single proportion formula assuming:

p = 0.30 d=0.05 and z=1.96

$$n = \frac{z^2 (p)(1-p)}{d^2}$$

Whereas; n=sample size

Z=confidence interval (1.96)

P=estimated prevalence (0.30)

d= margin of sampling error to be tolerated (0.05)

To get the sample size with confidence interval of 95% and margin of error 5% and at 5% (α= 0.05), and 5% non-response rate were used. Therefore, actual total sample size was (n final + 5% non-response rate

$$n = \frac{(1.96)^2 0.30(1-0.30)}{0.05^2} = 322.6 \approx 323$$ then 323 of 5% =16 then 323+16 =339

Therefore, a total of 339 pediatric patients who were underwent a surgery was participate in this study.

Then to calculate sample size for each Hospital is based on sample size to each strata.

$$n_j = \frac{n}{N} N_j$$

n_j =is the sample size of each hospital allocation.

NJ=is the source population size of the each hospital

n=n1+n2+……..nk =is the total sample size

N=N1+N2……..NK=is the total population size of each Hospital.

TASH =194 Minillik II =98 Zewuditu memorial =116 St Paulo's =92 this source number is depending upon average values of the previous surgery per three months on the log book.

Total=194+98+116+92=500

Calculated Sample size=339

Each sample size will be

TASH= (339/500) × 194=132 Minillik II = (339/500) × 98=66

Zewuditu memorial = (339/500) × 116 SPMH= (339/500) × 92=62

Total =132+66+79+62=339

4.7.2. Sampling technique

There were 13 public hospitals in the city. From those 13 hospital 7 of them were functional on pediatric elective case operation and from 7 functional hospital I was randomly selected by lottery method four hospital. Those selected were used for data collected for my research. These were Black Lion hospital, Zewuditu memorial hospital, Minillik II hospital and St Paulo's hospital respectively. The sample size for each hospital were determined by proportion allocation and each sample from each hospital was selected by Systematic random sampling technique on daily operation schedule list.

Depending upon average values of the Situational analysis was done for 3 months before the start of the study, the total average of 500 patients were operated on elective schedule in four hospitals.

The sampling interval; K was determined using the formula: K=N/n; 500/339 = 1.47≈2

Where, n = total sample size, N = population per 3 month

Therefore, the sampling interval was two and the first study participant (random start) was selected using lottery method from the daily surgery list. Each day before elective surgery begun patients were selected by systematic random sampling technique.

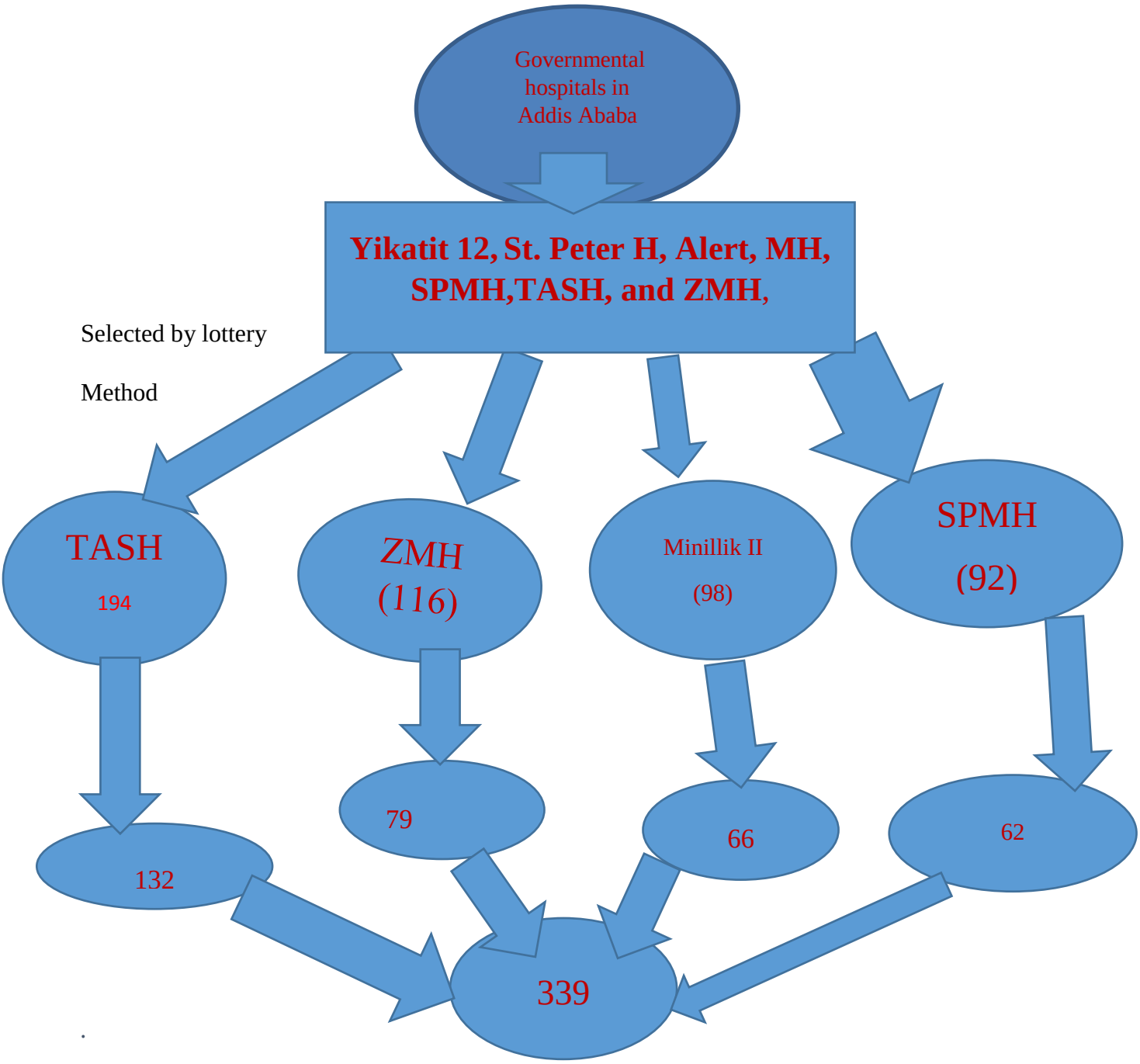

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Figure 2-Schematic presentation for proportional allocation of pediatric patients who underwent surgery at selected public hospitals of Addis Ababa Ethiopia, 2021.

4.8 .Data collection procedures

Data was collected from selected study participants using pretested questionnaires. After providing training for data collectors and having verbal informed consent taken from their parent's data was collected using questionnaire. Questionnaires mainly addressed Socio-demographic data like the patient's age, sex, and ASA physical status, coexisting illness & other variables record from the chart.

The temperature of the participants was measure intra operatively in the day of Surgery using digital axillary thermometry with an accuracy of +/- 0.1 c^o by placing the probe of the thermometer in the armpit close to the axillary artery while tightly adducting the arm. The ambient temperature was also record after the patient enters in to the operation room by using digital room thermometer and intraoperative body temperature of the patients was taken after surgery before extubation the patients.

4.9. Data quality control

To ensure quality of data, training on objective &relevance of the study was and brief orientation was given for data collectors. Pre-test of the questionnaire was done on 5% of patients from the study population at Yekatit 12 Hospital was done. The result of pre-tested were not included in the final analysis. Based on the pretest questions were revised, edited and others modifications were done before actual data was collection. During data collection each questioner was revised by principal investigator for completeness, accuracy and clarity. In case of missed questioner necessary correction was done accordingly on the questionnaire for the main study. The data was collected by BSc anesthetists after training had been given .It were supervised by consult anesthetist and investigators.

4.10. Data analysis and interpretation

The collected data was coded and entered in to SPSS version 26 by manually and analyze using SPSS version 26 window to assess the magnitude of intraoperative hypothermia and its associated factors in pediatric patients who underwent surgery

Independent variables, were analyze using binary &multi logistic regression to determine the clinical variables that were independently predictive of intra-operative hypothermia. Odds ratio, 95% confidence interval, and p-value was computed to identify associated factors and

to determine the strength of the association. Variables with p-value less than 0.2 on binary logistic analysis was take to multivariable analysis. Both Crude Odds Ratio (COR) in bi-variables logistic regression and Adjusted Odds Ratio (AOR) in multivariable logistic regression with the corresponding 95% Confidence interval was calculate to show the strength of association. In multivariable logistic regression analysis, variables with a p-value of <0.05 were consider as statistically significant The result were presented by using text, table's, charts and graphs.

4.11 .Ethical consideration

The research was conduct after obtaining ethical clearance and approval from Addis Ababa University institutional review board and department of anesthesia. Official support letter were write for those selected governmental hospitals of Addis Ababa which was conduct the research. The purpose of the study was explain & verbal informed consent was obtain from the parent's parents.

4. 12. Dissemination of Results

The final research paper would be given for those selected governmental hospitals of Addis Ababa which were conducted the research and the result would be presented on workshops and Ethiopian Association of Anesthetists Annual Conference, so that every anesthetist would be aware of the magnitude of Intraoperative hypothermia and its associated factors. Moreover efforts were done to publish the finding of the study.

Chapter Five: Result

5.1. Socio-demographic characteristics of study participants

A sample of 339 study participants were involved in this study with response rate 100%.The majority of participants in this study were males 207(61.1%).The mean and standard deviation Wight of participants were 13.58±8.4 respectively.

The highest number of age group were founded between 1 and 12 month which was 112(33%) and followed by the age group one up to five years old which was 104(30.7%).With regards of American Society of Anesthesiologists (ASA) states 220(64.9%) of participants were ASA 1,98(28.9%) were ASA II and 21(6.2%) were ASA III respectively.

With regards of medical illness 85(25.1%) of patients were had coexisting medical illness. The most common medical illness were congenital heart disease 30(35.7%) and hypertension with renal problem 19 (17.9%).

Table 1-Socio-demographic characteristics of patients who underwent elective surgery at TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.(n=339)

Variables	Category	Frequency	Percentage (%)
Age	Neonate	41	12.1
	Infant	112	33
	Toddler	104	30.7
	Children	69	20.4
	Adolescent	13	3.8
Sex	Male	207	61.1
	Female	132	38.9
Specific	CHD	30	35.7
Medical	DM	19	22.6
Disease	HTN	15	17.9
	Others	20	23.8
ASA States	ASAI	220	64.9
	ASAII	98	28.9
	ASAIII	21	6.2
Coexisting	Yes	85	25.1
	No	254	74.9

5.2 .Anesthetic and surgical characteristics of study participants

Regarding types of surgery there were various type of surgery was done majority of respondents were gastrointestinal surgery 82(24.2%) then followed by urology surgery 66(19.5%), neurosurgery 59(17.4%), ENT Surgery50 (14.7%), Orthopedic surgery32 (9.4%), general surgery27 (8%) and thoracic related surgery 23(6.8%).

With type of anesthesia the majority of patient were done by only general anesthesia which were 237(69.9%) and the remaining was done with caudal anesthesia which was combined with general anesthesia 102(30.1%).The median and mean temperature of operation room was 24c^{o} and 24.28 respectively with standard deviation of 2 most respondents were done with operation room temperature of less than 26 c^{o} 247(72.9%) & the remaining were greater than and equal to 26 c^{o} 92 (27.1%).

The mean & Standard deviation of surgical duration and anesthetic duration were 126.6±29.3 minute and 139.7±31.5 minute respectively and their median were 125 &135 respectively.

Table 2-Intra-operative surgery and anesthesia related factors of patients who underwent elective surgery at TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.(n=339).

Variables	Category	frequency	Percentage (%)
Operation room	<26c^{o}	252	74.3
temperature	≥26c^{o}	87	25.7
Surgery	Orthopedic	32	9.4
type	Neurosurgery	59	17.4
	ENT	50	14.7
	Urology	66	19.5
	Gastrointestinal	82	24.2
	General	27	80
	Thoracic	23	6.8
Anesthesia Type	General only	237	69.9
	Combined	102	30.1

Induction	Ketamine	30	8.8
agent	Thiopental	60	17.7
	Propofol	124	36.6
	Ketamin&propofol	125	36.9
Relaxant	suxamethonium	69	20.4
agent	Vecuronium	13	3.8
	Pancuronium	4	1.2
	Suxamethonium&Vecronim	201	59.3
	suxamethonium & Pancuronium	52	15.3
Analgesic agent	Pethedine	136	40.1
	Morphine	119	35.1
	Tramadol	38	11.2
	Other	46	13.6
Volume of	≤500	182	53.7
Fluid administer	≥500 ml	157	46.3
Warmed fluid	yes	165	48.7
administer	No	174	51.3
Is blood	Yes	48	14.2
transfused	No	291	85.8
Warmed blood	Yes	24	51.1
transfused	No	23	48.9
Duration of Surgery time	<120 minute	138	40.7
	≥120minute	201	59.3
Duration of Anesthesia time	≤120 minute	111	32.7
	≥120minute	228	67.3

5.3. Magnitude of intra-operative Hypothermia

In this study the Magnitude of intra-operative hypothermia who undergone elective pediatric surgery with general anesthesia was 39.8% from 339 patients.

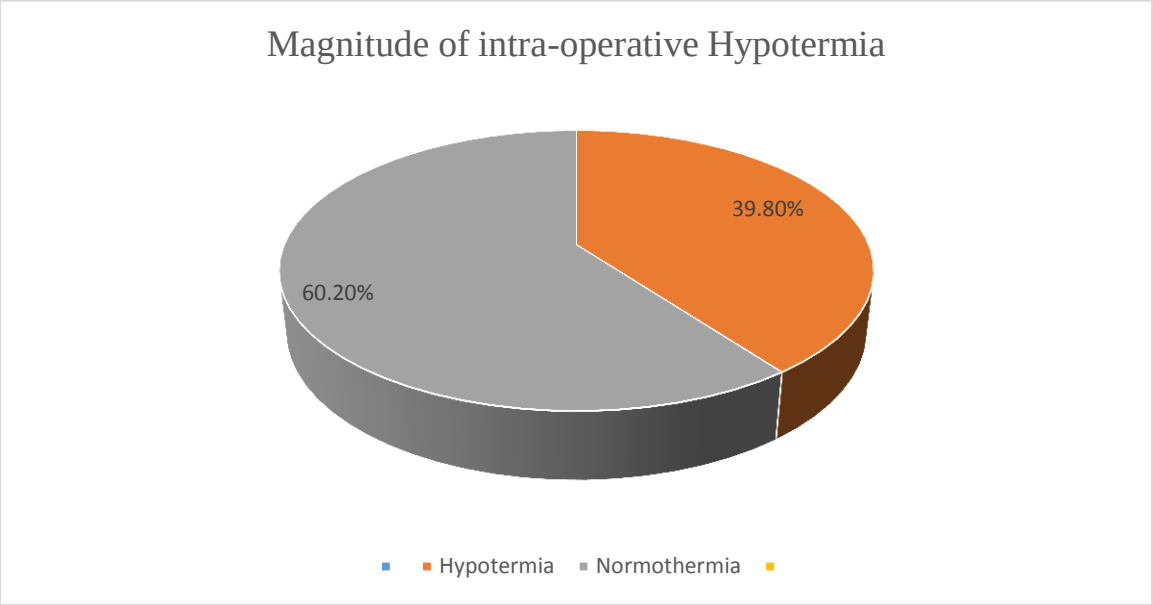

Figure 3-Magnitude of intra-operative hypothermia of patients who underwent elective surgery in TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.

5.4 .Factor Associated with Intra- operative Hypothermia:

5.4.1. Results of binary logistic regression analysis

Binary logistic regression analysis was conducted to check the association between independent variables with intra-operative hypothermia. According to binary logistic regression analysis, being neonate is 4.6 higher odds to develop intra-operative hypothermia [COR; 4.7(95%CI: (1.12, 19.7)], in reference to adolescent children. Patients who were American Society of Anesthesiologist (ASA) States two were 2.4 higher odds to develop intra-operative hypothermia [COR; 2.4(95%CI: (1.48, 3.94)], with reference to American Society of Anesthesiologist (ASA) States one. Patients having history medical illness were 1.8 higher odds to develop intra-operative hypothermia [COR; 1.8 (95%CI: (1.1, 2.96)] compared with those who were hadn't medical illness.

Patients who were underwent Anesthesia and surgery in room temperature less than $26c^0$were 5.9 higher odds to develop inter-operative hypothermia than those who were underwent surgery with room temperature greater than $26c^o$[COR;5.9(,95%CI, 3.1,11.2)].Patients who received greater than 500 mill liter were 1.5 higher odds to develop inter-operative hypothermia than patients who were received less than 500ml [COR; 1.5, (95%CI, 0.98, 2.35)] and Patients who were received un warm fluid during intra-operative surgery were more than 2.7 higher odds to develop intra-operative hypothermia compared with received warm fluid during surgery [COR; 2.7, 95%CI, 1.7, 4.25)].

In this study patients who were underwent surgery greater than 120 minute were more than 8.5 higher odds to develop intra-operative hypothermia [COR; 8.55(95%CI, 4.89, 14.95)] compared with who were underwent surgery less than 120 minute. Patients who were received anesthesia more than 120 minute were 12 higher odds to develop intra-operative hypothermia [COR; 12.23(95%CI, 6.09, 24.7)] with reference to patients who were received anesthesia less than 120 minute.

Table 3-Binary logistic regression analysis of Factor associated with Intra-operative hypothermia in surgical patients operated in TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.(n=339)

Variables		Intra operative hypothermia yes	NO	COR(95%CI	P-value
Age Group	Neonate	24(58.54%)	17(41.46%)	4.7(1.12,19.7)	**0.034***
	Infant	48(42.85%)	64(57.15%)	2.5(0.665,9.58)	**0.181***
	Toddler	38(36.5%)	66(63.5%)	1.9(0.49,7.4)	0.344
	Children	22(31.89%)	47(68.11%)	1.5(0.39,6.24	0.529
	Adolescent	3(23.1%)	10(76.9%)	1	
	Male	84(40.57%)	123(59.43%)	1.1(0.694,1.69)	0.722
Sex	Female	51(36.63%	81(61.37%)	1	
ASA States	ASAI	72(32.7%)	148(67.3%)	1	
	ASAII	53(54.1%)	45(45.9%)	2.42(1.48,3.94)	**0.001***
	ASAIII	10(47.6%)	11(52.4%)	1.86(0.76,4.6	**0.17***
Medical	Yes	43(50.6%)	42(49.4%)	1.8(1.1,2.96)	**0.02***
co -existing	No	92(36.2%)	162(63.8%)	1	
Specific	CHD	15(50%)	15(50%)	1.5(0.477,4.72)	0.488
Medical	DM	12(63.16%)	7(36.84%)	2.57(0.71,9.36)	0.252
Disease	HTN	7(46.67%)	8(53.33%)	1.3(0.32,5.08)	0.694
	Others	8(40%)	12(60%)	1	
Surgery type	Orthopedic	12(37.5%)	20(62.5%)	0.93(0.31,2.8)	0.9
	Neurosurgery	29(49.2%)	30(50.8%)	1.5(0.56,4.00)	0.4
	ENT	16(32%)	34(68%)	0.73(0.26,2.04)	0.55
	Urology	31(37.8%)	51(62.2%)	0.95(0.36,2.44)	0.91
	Gastrointesti	27(40.9%)	39(59.1)	1.01(0.408,2.8)	0.88

	nal				
	General	11(40.7%)	16(59.3%)	1.06(0.343,3.33)	0.9
	Thoracic	9(39.1%)	14(60.9%)	1	
Anesthesia type	GA	94(39.7%)	143(60.3%)	0.98(0.609,1.57)	0.93
	Combined	41(40.2%)	61(59.8%)	1	
Operation room temperature	< 26c^{o}	122(49.4%)	125(50.4%)	5.9(3.1,11.2)	**0.001***
	≥26c^{o}	13(14.13%)	79(85.87%)	1	
Is administered fluid warmed	Yes	46(27.9%)	119(72.1%)	1	
	No	89(51.14%)	85(48.86)	2.7(1.7,4.25)	**0.001***
Volume of Fluid Administer	<500	64(35.2%)	118(64.8%)	1	
	≥500	71(45.2%)	86(54.8%)	1.5(0.98,2.35)	**0.06***
Surgery time duration in minute	≤ 120 minute	19(13.8%)	119(86.2%)	1	
	>120 minute	116(57.7%)	85(42.2%)	8.55(4.89,14.95)	**0.001***
Anesthesia time in minute	≤ 120 minute	10(9.1%)	101(90.9%)	1	
	>120 minute	125(54.8%)	103(45.2%)	12.23(6.09,24.7)	**0.001***

1 = Reference Group COR =Crudes Odds Ratio

CI =confidence Interval * = p< 0.2 value

5.4. 2.Results of multivariable logistic regression analysis

When adjusted those variables Age, room temperature, un-Warm fluid Administered, volume of fluid administered, duration of surgery and Duration of anesthesia were Associated with intra-operative hypothermia.

In this study patients who were neonate, and infant age group were 15and 8.4 times more likely to develop intra-operative hypothermia when we compared with adolescent age group [AOR;15,(95%CI,2.256,101.8)] & (AOR=8.4,95%CI,1.548,45.86) respectively. Patients who were underwent Anesthesia and surgery in ambient temperature less than $26c^0$were 6 times more likely to develop inter-operative hypothermia than those who were underwent surgery with room temperature greater than $26c^o$[AOR;6,(95%CI,2.859,13.231)].

Patients who received greater than half liter were 3.6 more likely to develop inter-operative hypothermia than patients who were received less than 500ml [AOR; 3.6, (95%CI, 1.83, 7.23)] and Patients who were received un warm fluid during intra-operative surgery were more than two times more likely to develop intra-operative hypothermia compared with received warm fluid during surgery [AOR, 2.2, (95%CI, 1.28, 4.05)]. In this study patients who were underwent surgery and anesthesia greater than 120 minute were more than three and 3.8 times more likely to develop intra-operative hypothermia than those who were underwent surgery and anesthesia less than 12o minute [AOR;3.4,(95%CI,1.297,8.797)] and (AOR=3.8,95%CI,1.25,11.53) Respectively.

Table 4-multivariable logistic regression analysis of Factor associated with Intra-operative hypothermia in surgical patients operated in TASH, ZMH, Minilik II and SPMH, Addis Ababa, Ethiopia from February 1- April 30, 2021.(n=339)

Variables		Intra-operative hypothermia		COR(95%CI)	AOR(95%CI)	P-value
		yes	NO			
Age Group	Neonate	24(58.54%)	17(41.46%)	4.7(1.12,19.7)	15(2.256,101.8)	**0.005***
	Infant	48(42.85%)	64(57.15%)	2.5(0.665,9.58)	8.4(1.548,45.86)	**0.014***
	Toddler	38(36.5%)	66(63.5%)	1.9(0.49,7.4)	4.4(0.84,23.148)	0.079
	Children	22(31.89%)	47(68.11%)	1.5(0.39,6.24)	2.3(95%,	0.3
	Adolescent	3(23.1%)	10(76.9%)	1	1	
ASA States	ASAI	72(32.7%)	148(67.3%)	1	1	
	ASAII	53(54.1%)	45(45.9%)	2.42(1.48,3.94)	1.9(0.71,5.0)	0.2
	ASAIII	10(47.6%)	11(52.4%)	1.86(0.76,4.6)	2.3(0.46,11.3)	0.3
Medical	Yes	43(50.6%)	42(49.4%)	1.8(1.1,2.96)	0.848(0.329,2.19)	0.73
co –existing	No	92(36.2%)	162(63.8%)	1	1	
Operation room temperature	< 26c^{o}	122(49.4%)	125(50.4%)	5.9(3.1,11.2)	6(2.86,13.23)	**0.001***
	≥26c^{o}	13(14.13%)	79(85.87%)	1	1	
Is administered fluid warmed	Yes	46(27.9%)	119(72.1%)	1	1	
	No	89(51.14%)	85(48.86)	2.7(1.7,4.25)	2.3(1.28,4.05)	**0.005***
Volume of Fluid Administer	≤500	64(35.2%)	118(64.8%)	1	1	
	≥500 ml	71(45.2%)	86(54.8%)	1.5(0.98,2.35)	3.6(1.8,7.2)	**0.001***
Is blood transfused	Yes	25(52.1%)	23(47.9%)	1	1	
	No	110(37.8%)	181(62.2%)	0.56(0.3,1.03)	0.87(0.38,1.99)	0.73
Surgery time duration in minute	≤ 120 minute	19(13.8%)	119(86.2%)	1	1	
	>120 minute	116(57.7%)	85(42.2%)	8.55(4.89,14.95)	3.37(1.29,8.79)	**0.013***
Anesthesia time in minute	≤ 120 minute	10(9.1%)	101(90.9%)	1	1	
	>120 minute	125(54.8%)	103(45.2%)	12.23(6.09,24.7)	3.79(1.25,11.5)	**0.019***

1 = Reference Group COR =Crudes Odds Ratio

CI =confidence Interval AOR =Adjusted Odd ratio * = statically Significant p<0.05 value

Chapter Six: Discussion:

In this study over all magnitude of intra-operative hypothermia is 39.8% with body temperature range from 33.4-37.8c^0. According to this study, there is higher magnitude of intra-operative hypothermia who underwent elective pediatric surgery with general anesthesia. In multivariable analysis room temperature, un-warm fluid Administered, volume of fluid administered, duration of surgery and duration of anesthesia were significantly associated with intra-operative hypothermia. But age were weak associated with intra-operative hypothermia because there is wider range of confidence interval.

The magnitude of current finding is higher than a prospective observational study conducted in 100 pediatric patients in August 2013 at Kenyatta national hospital by Kioko et al was 30 %(31). But in this study the magnitude was 39.8%.This variations could be due to deference in technique of measurement with its site and may be due to difference in sample size.

The magnitude of this study is lower than a prospective observational study conducted in 530 pediatric patients in Michigan Hospital and Health center at United State of America (USA) by Pearce .B et al in 2010. Which was 52%(20).This possible reason could be due to difference in studying clinical setups, population difference and may be due to seasonal variation. In Contrast to Another prospective observational study conducted in 103 pediatric patients at University teaching hospital of Kigali by Uwimana et al in 2018 magnitude of intra-operative hypothermia was higher than in this study. Which was 71.7%(17).But in our study the magnitude was 39.8% the possible reason could be due to difference in ambient temperature regulating and difference in definition of the intra-operative hypothermia of the study.

In this study pediatric patients ages specially neonates [AOR; 15, (95%CI, 2.256, 101.8)] and infants [AOR; 8.4, 95%CI, 1.548, 45.86)] were statistically significant association with intra-operative hypothermia. This study was consistent with previous study conducted in 2018 at Malaysia university of Malaya, Kuala Lumpur by Lee-Lee Lai et al on 502 pediatric patients were neonates and infants significant associated with intra-operative hypothermia . The possible reason could be due to undeveloped physiological thermoregulation mechanism and less subcutaneous tissue with their large body surface area to their body size compared to older children(21).

In this study result finding during less than 26c^{o}[AOR;6,(95%CI,2.859,13.231)] room temperature were significant associated with intra-operative hypothermia .This is consistent with A study conducted in India at 2014 by Bajwa.SJS et al showed that during intra-operative surgery and anesthesia with low room temperature were significantly associated with intra-operative hypothermia(15).This might be due to heat loss easily to the surrounding area in neonates compared to adult children because they have higher surface area to volume ratio, immature hypothalamic thermo regulatory center with less insulating subcutaneous tissue.

This study showed that Patients who were received un-warm fluid [AOR, 2.2, (95%CI, 1.28, 4.05)] during intra-operative were 2.2 times more likely to develop intra-operative hypothermia compared with received warm fluid during surgery). This is consistent with a study conducted in 2011 at Louisiana State University health science center by Sturt. R heart et al states that pre-warming administer fluids and other materials reduce intra-operative hypothermia because un warmed fluid administration had significant associated to intra operative hypothermia(5).

Administration of greater than one litter of fluid, (p=0.007) were significantly associated with intra-operative hypothermia. This is consistent with a study conducted at university of health science Kanuni Sultan Suleyman Hospital, Instanbule Turkey in August 2015 implied that Unavoidable heat loss were commonly happened in pediatric patients receiving general anesthesia with high volume of fluid administration results significantly associated with intraoperative hypothermia(1). The possible reason could be due to redistribution of high volume of fluid to the system and results reduction of heat.

We also observed in this study pediatric patients who underwent long duration of surgery greater than 120 minute [AOR; 3.4, (95%CI, 1.297, 8.797)] and who received anesthesia greater than 120 minute [(AOR; 3.8, (95%CI; 1.25, 11.53)] were statistically significant association with intra-operative hypothermia. This study similar with previous study conducted in 2010 at Michigan Hospital and Health center at United State of America (USA) by Pearce .B et al (6,18).

The possible reason could be when a patients Wait for long duration with under surgery and anesthesia the response to hate loss will be decrease due to suppuration of thermoregulatory center by anesthetic agent and they will be loss heat easily due to contact with cold materials of

surgery instrument and due to received more intravenous fluid during surgery for replacement of blood loss and other deficit replacement.

7. Strength and Limitation of study

7.1 .Strength of study

- The strength of study was the sample size was relatively higher than the previous study this used to decrease the confounding factor by increases the sample size.
- The study was multicenter so this used for generalization of the result.
- It would be helpful us a base line of information for future researchers

7. 2. Limitation of study

- The limitation of this study was use of digital axillary thermometer us measurement of core body temperature.
- In this study there was different types of case and procedure were included this may affect the result due to cofounding with each other.
- Limited publish article in Ethiopia and Africa.

8. Conclusion and Recommendation

8.1 .Conclusion:

This study revealed high magnitude of intra-operative hypothermia in pediatric patients. Operation room temperature less than $26c^0$, un-warm fluid Administered, greater than half liter of fluid administered, duration of surgery and anesthesia greater than 120 minuet were significantly Associated with intra-operative hypothermia.

8.2 .Recommendation:

Based on this study finding, my recommendation for ward to:

For Anesthetists:

- During the clinical practice of anesthesia every anesthetist should be monitor temperature of the patients especially during intra-operative surgery continuously throughout the end of surgery.
- I would like to advice for anesthetist to use warm IV fluid & and maintaining of room temperature $26c^0$.

For public healthy planner and administrator:

- I would like to advice for public healthy planner to develop guide line for prevention and management of intra-operative hypothermia.
- For Addis Ababa Heath Administrators and specially Black Lion hospital, Zewuditu memorial hospital, Minillik II hospital and St Paulo's hospital hospitals managers, we recommended to plan ways of strategic method for prevention of intra-operative hypothermia for better outcome.
- We recommended for researcher to conduct further study on prevention and outcome of intra-operative hypothermia.

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Annex-I: Information sheet

Introduction: This information sheet is prepared to explain the research project that you are asked to join by a group of research investigators.

The research team includes the investigator, senior advisor from AAU ,four data collectors and supervisor.

Name of Principal investigator: Getachew Mekete Diress

E-mail gechdtuchs16@gmail.com

Phone +251940471898

Advisor's name: - 1. Geresu Gebeyewu (BSc. MSc. lecturer of anesthesia)

2. Suliman.J (BSc. MSc. lecturer of anesthesia)

Name of sponsor: - AAU

Name of organization: - AAU, Health science college, anesthesia department.

This information sheet is prepared by the above mentioned investigator.

Risk: There is no any risk or harm that the patient will face by participating in this research.

Benefits: There is no incentive or payment to be gained by taking part in this project but the results of this research will help for hospital administrators to plan preventive measures, program planners and policy maker's strategies to prevent and reduce intra operative associated hypothermia.

Confidentiality: The information collected from the study subjects will be kept confidential and stored in a file, without your name by assigning a code. This research project will be reviewed and approved by ethical committee of the AAU.

Annex-II: Individual informed consent form

Addis Ababa University college health sciences, school of graduate studies, department of Anesthesia

Questionnaire prepared to assess the magnitude and associated factors of intra operative Hypothermia

Consent form

My name is _____. I am one of the members of the research team in Addis Ababa University department of anesthesia. The purpose of this questionnaire is to gather Information on the magnitude and factors that predispose to intra operative Hypothermia.

I have identified you as a study participant hoping that you would be willing to help me by providing with some information. All information obtained from you will be kept Confidential. I will not include such as your name or exact address. Your role in this research is important and this study will provide base line information will help to determine the magnitude, associated factors and to take appropriate measures for other patients who undergo operation after the study.

I understood about the purpose of the research. Are you voluntary to participate in the study?

A. Yes B. No

If respondents are voluntary to participate, the interview as well as the data collection will be Started.

Questionnaire Code _____

Date of data collection _____

Name of Principal investigator: Getachew Mekete Diress

E-mail gechdtuchs16@gmail.com

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Advisor's name: - 1. Geresu Gebeyewu (BSc. MSc. lecturer of anesthesia)

2. Suliman.J (BSc. MSc. lecturer of anesthesia)

Name of sponsor: - AAU

Name of organization: - AAU, Health science college, anesthesia department

This information sheet is prepared by the above mentioned investigator.

Annex III: Amharic information sheet

አድስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ ህክምና ትምህርት ቤት፣የአንስቴቫርያ ትምህርት ክፍል

የመጠይቅ ፈቃደኛነት ቅጽ ፡

ስሜ _____ ይባላል፡፡እኔ በአዲስ አበባ ዩኒቨርሲቲ በአንስቴዝያ ትምህርት ክፍል የምርምር ቡድን ውስጥ አንድ አባል ነኝ.የዚህ መጠይቅ አላማ ህጻናትቀዶጥገናበሚደርጉበትጊዜ በኦፕራሲዎን ጊዜ ተከትሎ ስለሚከሰት የሙቀት መጠን መቀነስ እና መንሴዎች ለሚደረገው ምርምር/ጥናት /መረጃ ለመሰብሰብ ነው፡፡

የእርስዎልጅአንድየጥናቱክፍልአድርጌስመርጥአስፈላጊየሆኑመረጃዎችንእንደሚሰጡኝበማሰብነዉ ፡፡

በጥናቱለመሳተፍፈቃደኛከሆኑከእርስዎየሚገኘውማንኛውምመረጃበሚስጥርይጠበቃል፡፡ለዚህምሲባ ልየእርስዎምሆነየልጅዎሥምናአድራሻአይገለጽም፡፡እንድሁምከጥናቱበኋላኦፕራሲዎንለሚደረግላቸ ዉህጻናትቀዶጥገናበሚደርጉበትጊዜተከትሎ ስለሚከሰት የሙቀት መጠን መቀነስ እና መንሴዎች ለሚደረገው ምርምር/ጥናት /በከፍተኛ ሁኔታ ያግዛል፡፡ እንድሁም ለሙቀት መጠን መቀነስ ተገቢ የሆኑ እርምጃዎችን ለመዉሰድ ይረዳል፡፡
የቃል ሥምምነት፤

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሣተፍ
ሀ. ፈቃደኛ ሆኛለሁ

ለ. ፈቃደኛ አይደለሁም

በጥናቱለመሳተፍፈቃደኛከሆኑቃለመጠይቁንመቀጠልይቻላል፡፡

ፈቃደኛከሆኑየመጠይቁመለያቁጥር_____ መጠይቁየተካሄደበትቀን _____

የጠያቂውሥምናፊርማ _____

የሱፐርቫይዘርስምናፊርማ _____

ጥናቱንበተመለከተማንኛዉምአይነትጥያቄካላችሁየሚከተለዉንአድራሻተጠቀሙ::

በዋናነትምርምሩንየሚያካሂዉሰዉስም፡ ጌታቸዉ መከተ

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ኢሜል፡ gechdtuchs16@gmail.com

Annex –IIV: English Questionnaire

Instruction: For each of the following questions, please circle the number of alternative(s) that fit the response or fill the blank space.

Section I: Socio-demographic characteristics of the patient

S.No	Factors	Answer	If no, skip to
101	Patient Age	1. _____	
102	Sex of participants	1. Male 2. Female	
103	Weight in Kg	_____Kg	
104	ASA physical status	1. ASA I 2. ASA II 3. ASA III	
105	Is there any co existing medical Disease?	1. Yes 2. No	
106	If yes; specify the disease	_____	

Part II: Questions about anesthetic and surgical characteristics of the patient.

	Factor	Answer	If no, skip to
201	1. Orthopedics 2. Neurosurgery 3. ENT 4.Gastrointestinal 5. Urology 5. General surgery 6. Others		
202	1. GA 2.Caudal Anesthesia 3. Combined		

Part III: Questions about intra operative body temperature of patients

	Factor	Answer	If no, skip to
301	Body temperature of patients after 30 minute of induction before extubation_____(0C)		
302	OR temperature_____ 0C		

Part IV: Questions about intra operative characteristics of patients

	Factor	Answer	If no, skip to
401	Induction Agent	1. Ketamine 2. Thiopental 3. Propofol 4.Inhalational(hal,Isofl)underline one	
402	Muscle relaxant	1. Suxamethonium 2. Vecuronium 3. Pancuronium 4. Atracurarium	
403	Analgesics	_____	
404	Volume of LA for block	_____ml	
405	Total amount fluids administered	_____ml	
406	Is administered fluid warmed?	1. Yes 2. No	
407	Is blood transfused?	1. Yes 2. No	
408	Amount of intraoperative blood loss in ml	_____ml	
408	Amount of blood transfused in ml	_____ml	
409	Duration of surgery in minute	_____minutes	
410	Duration of anesthesia in minute	_____minutes	