



**COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF ANESTHESIA**

**ADHERENCE TO PRE-OPERATIVE FASTING GUIDELINES AND ASSOCIATED
FACTORS AMONG PEDIATRIC SURGICAL PATIENTS IN SELECTED
GOVERNMENT REFERRAL HOSPITALS, ADDIS ABABA, ETHIOPIA, 2020**

: CROSS SECTIONAL STUDY

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**THESIS SUBMITTED TO THE DEPARTMENT OF ANESTHESIA, COLLEGE OF
MEDICINE AND HEALTH SCIENCE; ADDIS ABABA UNIVERSITY IN THE
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER OF SCIENCE
IN ADVANCED CINICAL ANESTHESIA.**

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ABBREVIATIONS/ACRONYMS

AAU- Addis Ababa University

ASA –American society of Anesthesiologists

BLH- Black Lion Hospital

CI- Confidence Intervals

ESA-European society of Anesthesiologists

Hrs. - Hours

MSc- Masters of science

NPO-No Per Os

PONV- Post Operative Nausea and Vomiting

RCN-Royal College Nursing

ABSTRACT

Background: Fasting of children before anesthesia is mandatory with the aim of to reduce the complications of due to regurgitation, vomiting, aspiration during anesthesia and surgery. Prolonged fasting times have several negative implications in children due to high fluid turnover quickly leads to dehydration, perioperative hypotension, metabolic disturbances and hypoglycemia which leads to poor anesthetic outcomes.

Objective: The aim of this study was to assess adherence to preoperative fasting guidelines and associated factors among pediatrics patients undergoing elective surgery in Addis Ababa selected government Hospitals, Ethiopia, 2020.

Method: A cross-sectional survey was conducted in Addis Ababa selected government hospitals, Ethiopia in 2020. A total sample of 279 pediatric patients with age up 17 years scheduled for elective surgery included in the data collection. The data analysis was done with SPSS V.21 and the value of the variables and its associated factors was checked its association with logistic regression. Significance was determined at P -value <0.05. The result was presented by using text, tables, charts, and graphs.

Results: A total of 279 pediatrics patients were responded in the analysis with a 98.6% response rate. Majority of the participants 251(89.96%) were not followed the guidelines of preoperative fasting. The mean fasting time for clear liquids was 10 ± 4.03 (2-18 hrs.), for breast milk 7.18 ± 2.26 (3.5-12 hrs.), and for solid foods 13.5 ± 2.76 (8-19 hrs.). The reasons for which the preoperative fasting delayed was due to incorrect order 35.1% , prior cases procedures took longer times 34.1% changing sequence of schedule was 20.8%.

Conclusion: The majority of children were still having prolonged fasting practice. The staff's instructions and sequences of schedules are challenged to follow the international fasting guidelines protocol.

Key words: *preoperative, fasting, adherence, pediatrics, guideline.*

CHAPTER ONE: INTRODUCTION

1.1. Background

Preoperative fasting is a prescribed time frame before a procedure when patients are restricted the oral intake of liquids or solids. Children and adults are required to be fasted before anesthesia with the aim of decrease the volume and acidity of the stomach content in order to minimize the danger of regurgitation and aspiration of gastric contents during the procedure. Different leading societies of anesthesiologists developed guidelines that preoperative fasting protocol should be with the minimum fasting period for clear fluids 2 hours, for breast milk 4 hours, for infant formula, nonhuman milk, and solids foods 6 hours. In case of foods that contain fatty (meat) or fried foods further prolong gastric emptying time, which required eight or more extra fasting hours. This fasting time protocol (2:4:6) applies to patients of all age groups and undergoing elective surgical procedures.(1)(2)(3)

The physiologically goals of preoperative fasting is to decrease the danger of regurgitation, aspiration and the other complications during anesthesia and surgery.(4) All patients should be encouraged to take oral clear fluids (including water, pulp-free juice and tea or coffee without milk) up to two hours before elective surgical procedures.(3)

In contrast to habitual preoperative fasting, children's which have taken clear liquids till 2 hours before procedure have less hunger and thirst, lower rates of dehydration, and better hemodynamic stability.(5) Preoperative fasting can rapidly result in dehydration and the requirement for fluid replacement during anesthesia in addition to increase the potential for replacing blood lost during the surgery (6).

Therefore the liquid diet enriched with carbohydrates is given 2 hours before surgeries may give advantages for example, prevention of complications, decreased sensation of thirst, hunger, nausea and vomiting, insulin resistance, decreased hospital stay and improves the response to trauma. (7),(8)

Patients were fasted for delayed time, higher even than the recommended time and degree of the signs of discomfort such as hunger and thirst increased over time. So that to better recovery and the patient's comfort, it is important to build up a preoperative fasting protocol.(9)

The advantages of preoperative fasting are reducing risk of adverse events and increased patient hydration and comfort which has been led several of the main societies, i.e. Association of

Anaesthetists of Great Britain and Ireland (AAGBI), American Society of Anesthesiologists' (ASA) to develop new guidelines which is supporting more liberal preoperative fasting times guidelines.(10)

1.2. Statement of the problem

Significantly prolonged NPO times happen much of the time in most busy operation rooms caused by delays in the scheduling. This may result in patient frustration, anxiety, distress, fatigue, and anger.(11)

A study which showed that 70% of patients were fasted over twice the recommended length of time for both food and drink and 97% starved longer than required. (12) Study also showed that preoperative NPO times were greater than recommended in 70% of patients and 85% were instructed to remain NPO after midnight, and patients fasted from clear liquids for 11 hours and from solids for 14 hours.(5)(13)

Prolonged fasting times have several negative implications, and lead to poor anesthetic outcomes, in addition, to being stressful for both children and their caregivers.(14)(15) As a result of the high fluid turnover in children, fasting quickly leads to dehydration and perioperative hypotension. Metabolic disturbances, electrolyte imbalances, and hypoglycemia are other complications to be considered. (16)

Recently studies showed that pulmonary aspiration occurs only rarely as a complication of recent general anaesthesia practice and in fact.(1) Patients with prolonged fasting times is associated postoperative insulin resistance and prolonged stay of hospital(8). Studies have shown that pediatric patients prone to hypotension during general anaesthesia with 10-16 hours prolonged preoperative fasting experiences.(17)

In addition, the study carried out by Endale G. & Vidhya B. (2013) in Ethiopia at Gondar University hospital more than 50 % of the patients fasted from food twice the length of the recommended protocols. However, they are still following exactly preoperative NPO from midnight.(18)

The administrations of clear liquids shortly before procedures help to preserve intravascular volume; facilitating to get peripheral venous access, and enhancing hemodynamics. This also

helps to reduce hunger, thirst, and anxiety of patients, and good cooperation at the induction of anesthesia by reducing preoperative fasting times.(19) After changing the preoperative system mean preoperative fasting times in children decreased to 9 h and 4 h for solids and water, respectively.(20)

By reducing the length of fasting time has not increased the residual gastric volume nor is the gastric pH decreased. It has been demonstrated to be safe, improves patient wellbeing, reduces postoperative nausea and vomiting, reduces the risk of hypoglycemia and hypovolemia, and also helps in smooth anesthesia induction. (21)(10)

1.3 Justifications

Current guidelines advise children are routinely to fast with a minimum of prescribed recommendation times before general anesthesia with the aim of minimizing the risks of regurgitation and aspiration gastric contents. (1)(3)

Studies found that many patients are voluntarily fasting for a longer time period than recommended in spite of instructions are given. Significant proportions of patients do not understand the reasons to preoperative fasting in the surgical ward or preoperative assessment clinics.(10)

Adjusting fasting times according to the operating list and prescribing clear fluid drinks are safe strategies we could use to shorten fasting duration. Allowing oral clear fluids until 20 or 30 minutes before anesthesia induction of healthy children undergoing elective surgery may also be a safe strategy.(22)

Despite the strong of evidence to the contrary, most patients end up prolonged fasting hours because of delays and changes in schedules which exposed patients to metabolic response to the body. However, there is no any evidence showing that fasting 2–3 hours of oral clear or carbohydrate fluids before surgery, results in an increased risk of aspiration, regurgitation, or morbidity.(4)

This highlights importance of avoiding prolonged preoperative fasting. There was a need to evaluate preoperative fasting times to be able to assess the extent of prolonged fasting amongst pediatric elective surgery patients. With this information, the need for intervention and factors influencing preoperative fasting times was identified. The implementation of a solution contributed to improved patient comfort, satisfaction, and perioperative patients' outcome.

However, there are no studies on the preoperative fasting practice times in children at national level. The studies have done a limitation on studying separately children and adults and also used a limited number of cases were sampled. Thus, the aim of this study was to evaluate preoperative fasting practice in elective pediatrics patients. Hence, this study was addressed preoperative fasting experience and associated factors that prolonged fasting times. This study also can be used as baseline data to further research activities by researchers.

CHAPTER TWO: LITERATURE REVIEW

2.1 Preoperative fasting

Consultants and ASA members unequivocally advocate that for healthy infants, children and adults, fasting from the taking of clear liquids for 2 more hours before elective surgery requiring regional anesthesia, general anesthesia, or procedural sedation and analgesia should be maintained. (1)

From a clinical practical perspective, the 2-4-6 fasting convention is only possible for the first child on the list as the subsequent children are given only approximate fasting times. With new emerging evidence on the safety of liberalizing clear fluid oral intake to either 1 h or up to the time of anaesthesia, fasting times can be reduced even further. In a review of 10,015 children allowed unlimited intake of clear fluids up to the time of general anaesthesia, as Anderson et al. found that with an average fasting time of 1.7 hours the incidence of pulmonary aspiration of gastric contents to be 0.03%. (23)

A review conducted by Imani B et al. (2014) children should be encouraged to take clear fluids within 2 hours before surgical procedures and solid foods should be restricted for up to 6 hours before elective surgery. However, infants should be fed breast milk within up to 4 hours and formula milk for up to 6 hours. (24) Taking clear fluid 1 h before procedure may not significantly influence gastric volume or pH compared with 2 h. (25)

A study in UK from 1350 children presenting for dental procedures revealed median fasting hours of 12.08 h and 7.95 h for solids and liquids, respectively, with most of children reporting feeling 'extremely hungry' or thirsty on time of operating rooms admission. (22) Also, a study in US with 219 children showed that mean fasting times from liquids was 10.44 h, breast milk 8.3 h, and solids 10.62 h. (26)

The abbreviation of preoperative fasting time in children undergoing elective surgery with the usage of clear liquid and carbohydrate beverage is practical, safe and is not associated with an increased hazard of pulmonary aspiration. (27)

A cross-sectional survey was conducted by Alvi N. (2016) out of 102 children, up to age of 16 years scheduled for elective surgery only 4% of children could be labeled as having adherence to fasting. But, in 96% of children still practice far away the guidelines. (28)

A study conducted by Worknehe A. et al. (2016) reported that majority of patients (98.1%) were still having an order from midnight. The mean preoperative fasting hours were 15.3 ± 2.3 h (range 12.0-22.0 h) for liquids and 15.9 ± 2.5 h (range 12.0-25.3h) for solids. (29)

A study in conducted by Vikas Sharma et al. (2011) showed that pediatric patients in age group of 6 months to 6 years undergone general anesthesia are more prone to hypotension because of they have experienced prolonged preoperative fasting which has been to the order of 10-16 hours.(17)

An audit was conducted by Y. Buller et al. (2016) they found fasting for both clear fluids and solids was prolonged in both audits. In the first audit, 62% of children fasted longer than four hours for clear fluids, with an average fasting time of 6.3 hours. Of the children on morning operating lists, only 54% were given a drink before surgery.(30) A clinical audit were conducted by Pollach et al. (2014) a total of 631 children from 2008 to 2013 the overall mean fasting was 8.5 hours.(16)

Another audit performed by Arun and Korula, (2013) showed that changing the preoperative framework after the first audit in children the preoperative mean fasting times reduced to 4h and 9 h from 9.25 hrs. and 11.25 h for water and solids, respectively.(20)

A cross-sectional study of patients undergoing elective surgery was done in 2015 showed that common practice of fasting was to start from midnight for liquids and solids, and majority of the patients were grade II (64.6%) to the physical state. The average fasting time was 16 h (9.5-41.58) was higher than prescribed times (11 h, 6.58 -26.75). The patients submitted to procedures in the afternoon were in longer fasting times than those who did in the morning ($p < 0.001$). (9)

2.2 Factors associated with prolonged fasting

Newton and colleagues, by using a structured quality-improvement programme, they documented an increase of children fasting times less than 4 h from 19% to 72% because the implementation of a standard operating procedure checking on the fasting status on admission and permitting clear fluids up to 1 hour before anesthesia. Besides, nurses were urged to call to theatre to ask for permission to offer a beverage to children that were fasting for more than 4 hours.(25)

Kaska et al. (2010) performed a comparing study on preoperative fasting and preoperative preparation with either oral or intravenous intake, but oral intake shortly before surgery did not increase gastric residual volume and was not associated risk of aspiration.(31) In children who had carbohydrate drinks before surgical procedure is safe with a low insulin resistance postoperatively. (32)

A descriptive cross-sectional study was done by George N et al. (2017) the respondents reported varied sources of preoperative fasting instructions. The preoperative instructions information were delivered by the surgeons (5%), anesthesiologists (15%), and the nurses (80%). (33) The significance of preoperative fasting practice was reported by only 5.8 % of patients. In the initial audit reports the causes of prolonged preoperative fasting reports were incorrect orders given by nurses (74%) and alter in the sequence of surgical schedule (32%). But the major cause in reaudit was the change in surgical sequence (30%). (29)(20)

Compliance of preoperative fasting by children and parents is inadequate due to different reasons such as misunderstanding what fasting food entails, the reason for fasting, lack of supervision or intentionally misleading to avoid delays. Therefore liberalizing preoperative oral intake may reduce these problems. (14)

For the extended fasting time of the children the possible reasons may be fed earlier in the night on the night before surgery or changes in the operating schedule. Therefore, it may be better to advice parents to give their children food and drink at specific times rather than instructions for fasting at 2 h and 6 h before operation. (25)

A study conducted in bed safety-net teaching hospital in Southern California in 2016 among the cases were studied, 102 cases started at their scheduled times, and 168 cases (62.2%) were reported as significantly delayed. Cases considered to be significantly delayed were cases that

were deferred by an hour or more from the operating room template scheduled time. The foremost frequent reason for case delay and prolonged fasting time was previous case taking longer than planned time, which holds 59.5% of the delayed cases. The second most frequent reason for a delay was case order changes (14.3%) because surgeons decide to change the sequence of cases on the day of operation. The third reason for a delay was provider tardiness (11%). This was due to providers doing surgical procedures in another operating room, in the clinic out service, or the provider may absence in the surgery department.(11)

2.3 Conceptual framework

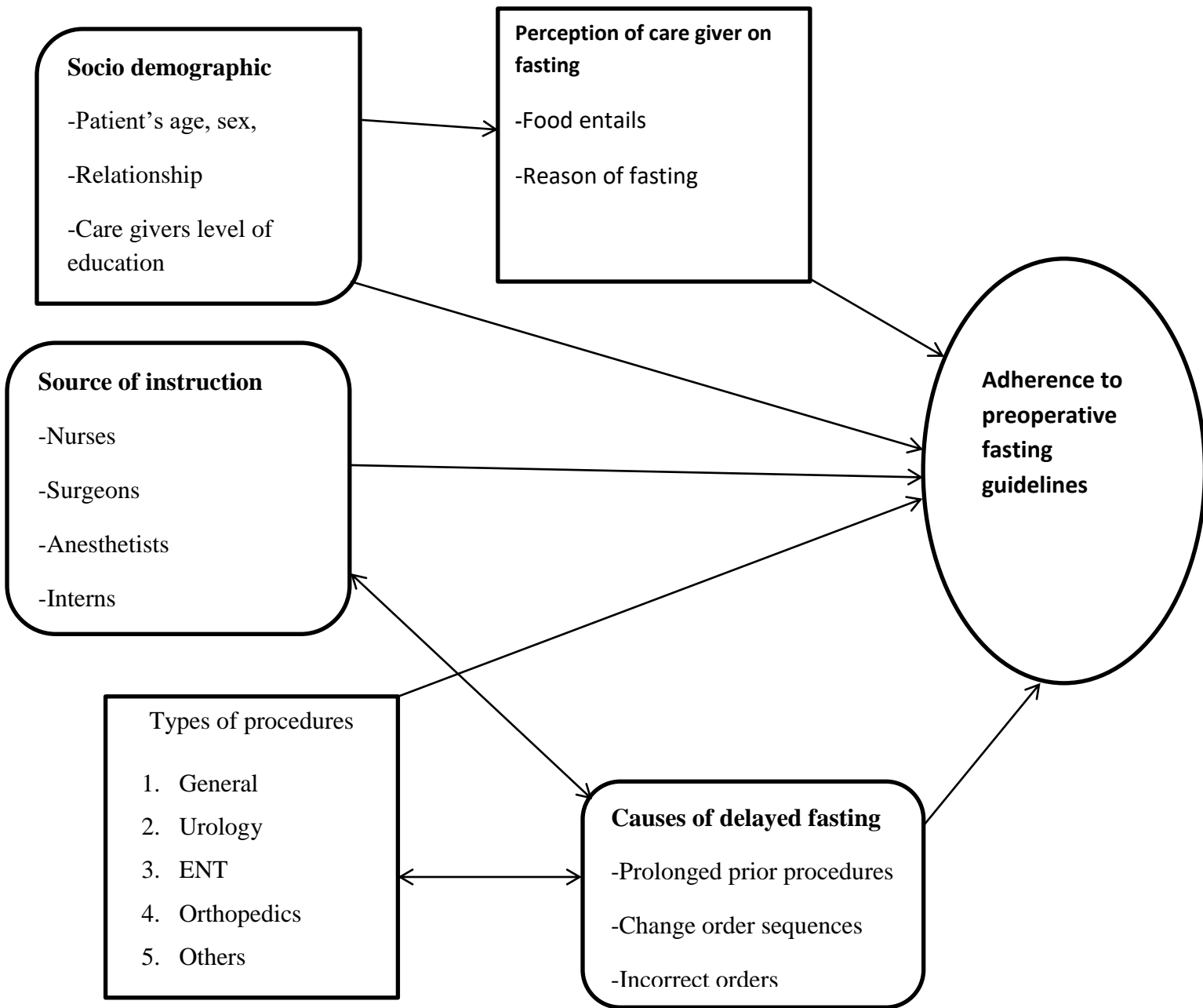


Figure 1: Conceptual framework of preoperative fasting adherence to guidelines

CHAPTER THREE: OBJECTIVES OF THE STUDY

3.1 General objective

To assess adherence to pre-operative fasting guidelines and associated factors among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, Ethiopia, 2020.

3.2 Specific objectives

3.2.1. To determine the level of adherence to preoperative fasting guidelines of pediatrics patients underwent surgery in selected government Hospitals, Addis Ababa, Ethiopia, 2020.

3.2.2. To identify associated factors of prolonged preoperative fasting among pediatrics surgical patients in selected government hospitals, Addis Ababa, Ethiopia, 2020.

CHAPTER FOUR: METHODOLOGY

4.1 Study area

This study was conducted in selected government Hospital of Addis Ababa; Addis Ababa is the capital city of Ethiopia, It is the largest city in Ethiopia with an area of 530 km² and with a population of 3,384,569 according to the 2007 population census. There are 13 government hospitals in the city. Out of 13 hospitals 11 has perform pediatric surgeries.

4.2. Study design and study period

A cross-sectional study was conducted from January 01, 2020 –March 30, 2020 in Addis Ababa, Ethiopia

4.3. Population

4.3.1. Source population

All pediatric patients who underwent surgery in Addis Ababa government Hospitals.

4.3.2. Study population

All pediatric patients those underwent elective pediatrics surgery in Addis Ababa selected government Hospitals during data collection period.

4.4 Inclusion and Exclusion criteria

4.4.1 Inclusion

All elective pediatrics surgical patients (neonates, infants and children up to an age of 17 years) with ASA class I &II preoperatively on fasting protocol were included in the study.

4.4.2 Exclusion criteria

Pediatric patients those are coming for emergency surgery were excluded during data collection.

4.5 Sample size determination

The *sample (n) size* was determined using the following single population proportion formula by assuming that the prevalence of preoperative fasting adherence as 0.5 with a 5% margin of error at 95% confidence interval.

$$n = \frac{(z_{\alpha/2})^2 \times (p \times q)}{d^2} \quad n = \frac{1.96^2 \times (0.5 \times 0.5)}{0.05 \times 0.05} \quad n = 384$$

Where; n = sample size, p= 0.5, z= 1.96, w= 0.05, α= 5% & CI= 95%

$nf = n / (1 + n/N)$, $N = 783$correction formula for population(Cochran's formula).

So, $nf = 384 / (1 + 384/783) = 257.37$ Then we added **10% of nf** for non-response rate; (i.e., $257.37 + 25.737 = 283.107$);

Therefore, total sample sizes of **283** surgical pediatrics patients were participated in this study.

4.5.1 Sampling procedures

The study area hospitals were selected with simple lottery method; out of 11 governmental city hospitals four hospitals were selected.

In the last three months reports of each hospital, 262 in TASH, and 193 in St. Paulo's hospital, 176 in Minillik II Hospital, and 152 in Alert Hospital elective pediatric surgeries were done on average. Finally the sample size was allocated proportionally to all hospitals based on reports.

A systematic sampling technique was used to get the required sample size during the study period. So during the study period a total of 783 pediatric patients underwent elective surgery. Since the calculated sample size was 283, 783 divided by 283 is 2.77. Then we have 95 pediatric patients undergoing surgery at TASH, 70 at St. Pawulos H, 63 at Minillik H, and 55 at Alert hospital. Systematic random technique was used during data collection on each Hospital after the first case selected on lottery method and every **kth** patient will be chosen for the study during the study period.

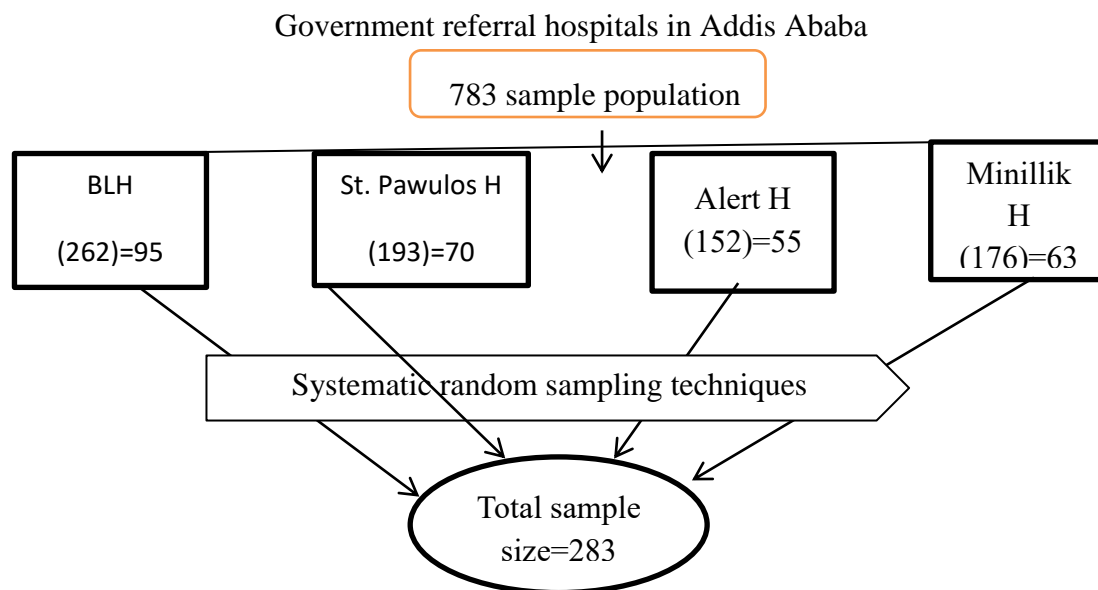


Figure 2. Schematic presentation for sampling techniques of adherence to preoperative fasting in Addis Ababa selected government hospital, 2020.

4.6 Study variables:

4.6.1. Dependent variable:

Adherence preoperative fasting

4.6.2. Independent variables

- Socio-demographic characteristics: age, sex,
- Types of surgery
- Types of food entails: solids, liquids and breast milk's.
- Fasting instructions order given
- Perception of parents for fasting
- Care giver (mother, father...)
- Sequence of cases schedule
- Time of anesthesia start

4.7 Data collection

Data was collected from patient's care givers and medical records by using questionnaires. Four anesthetists with experience of data collection and four MSc. Students were involved as data collectors and supervisors, respectively. The data collectors had taken consent from caregiver's, reviewed the patient's chart and documented the socio demographic, preoperative fasting instructions and time of fasting, type of procedures and time of anesthesia was started were collected from patients and care givers.

4.8 Data collection tools

A structured questionnaires consisting of socio demographic characteristics and preoperative assessment, preoperative fasting orders were asked and reviewed patients' medical record in reception area before the anesthesia. Information's on types of food entails, NPO hours and reason why their child have fasting protocols were asked the patients caregivers.

4.9 Ethical Considerations

Ethical clearance was obtained from ethical Review Board of Addis Ababa University (AAU), permission and letter of cooperation for the Hospitals obtained from department of anesthesia. Objective of the study was explained and permission was obtained from the clinical service coordinator of the hospital. Participant records were coded and only accessed by research team; hence confidentiality of participant records and privacy of the health facility was secured.

4.10 Data Processing and Analysis

Data were originally coded and entered in to EPI INFO version 7 statistical packages. Then it was transferred to SPSS version 21 computer program for analysis. Recoding and re-categorizing was made for selected relevant variables. Descriptive statistics was used to summarize data, using tables, percentages, graphs, figures, and mean values. The strength of association between variables was determined using bivariate and multivariable logistic regression, and odds ratio, with 95% confidence interval. The statistical significance was $P < 0.25$ for bivariate and $P < 0.05$ for multivariate regression. P-value of less than 0.05 was considered as statistically significant.

4.11 Data Quality Control and Assurance

Supervisors and data collectors were trained on the data collection instrument and its administration, objectives, and, right of respondents. Regular daily supervision of the data collectors and cross checking for completeness and accuracy of data was made by the principal investigator.

4.12 Operational Definition

- **Pediatric patient:** A patient ageless than 18 years old.
- **Elective surgery:** A surgical procedure which is scheduled in advance and is not considered an emergency.
- **Fasting:** The act of abstaining from food, drink or both for a period of time starting from order given from night to the start of anesthesia.
- **Fasting practice:** how patients were fasted prior to surgery.
- **Care giver:** a person who takes cares the patient in the hospital.
- **Adherence:** A patient who Follows the international minimum protocol of fasting 2:4:6 (for liquids, breast milk and solids respectively) during the preoperative periods.

4.13 Dissemination and Utilization of Results

The finding of the study will be submitted in a form of a thesis to AAU College of Health Science, Department of anesthesia. The result will be publicly defended following submission. Copies will be provided to relevant stakeholders. Efforts will be made to present the results in scientific conferences and to publish in reputable journals.

CHAPTER FIVE: RESULTS

5.1 Socio-demographic characteristics of the participants

A total of 279 pediatrics patients were recruited in the analysis with a 98.6% response rate. Participants' age, sex, caregivers' relationship and levels of education were assessed in this character. Participants' age of one month-two years was 57 (20.43%). Of the respondents 154 (55.20%) were males. Respondents of relationship with their child 189 (67.74%) were mothers, 68 (24.37%) fathers and 22 (7.89%) were others. Eighty-one (29%) of the caregivers had a secondary school level of education. (Table1)

Table 1: Socio-demographic characteristics of the study on pre-operative fasting adherence to guidelines and associated factors among pediatric surgical patients (N=279).

Variables	categories	N (%)
Patients Age (in year)	1month – ≤2 years	57 (20.43%)
	2 years – 17 years	222(79.57%)
Sex	Male	154 (55.20%)
	Female	125 (44.80%)
Care givers relationship	Mother	189 (67.74%)
	Father	68 (24.37%)
	Others (Sister, Brother...)	22 (7.89%)
Level of education of care givers	Illiterate	37 (13.30%)
	Can read and write	67 (24%)
	Primary school (1-8)	60 (21.50%)
	Secondary school (9-12)	81 (29 %)
	College and above	34 (12.2%)

5.2 Perception caregivers on preoperative fasting protocols

Based on the responses of the respondents, out of (n=279) the study participants 201(72%) of them respond that they were knowledgeable why their children had fasting before anesthesia and surgery. Majority of the response that the reasons they perceived to be fasted before surgery 108 (38.7%) had said requirement of surgery, followed by prevent anesthesia complications 37 (13.3%) and avoiding vomiting were 30(10.8%)

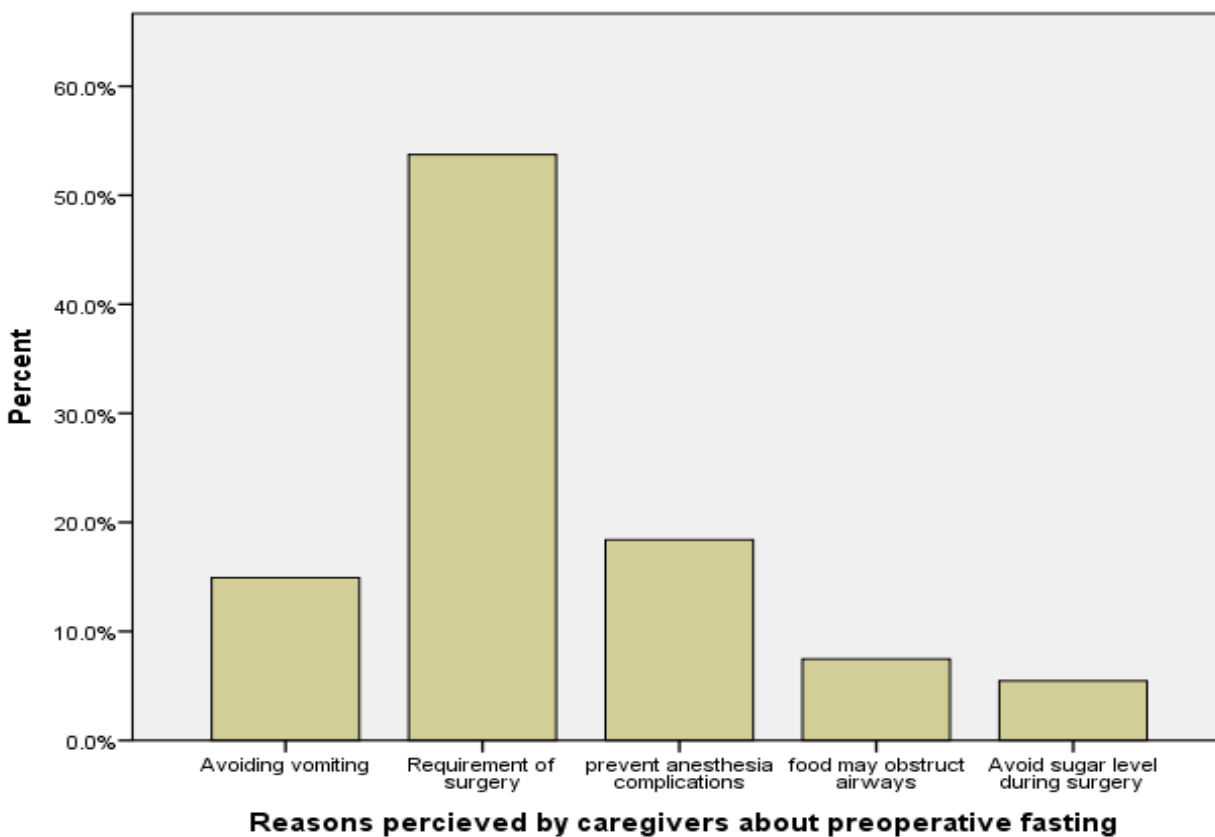


Figure 3. Perception of caregivers' reasons on preoperative fasting in selected government referral Hospitals, Addis Ababa, 2020.

5.3 Source of preoperative fasting instructions

As regards to sources of preoperative instruction orders that were given by nurses was 121 (43.37%) followed by surgeons 95 (34.05%) and Anesthetists was 59 (21.15%) before the day of surgery during preparing the patients.

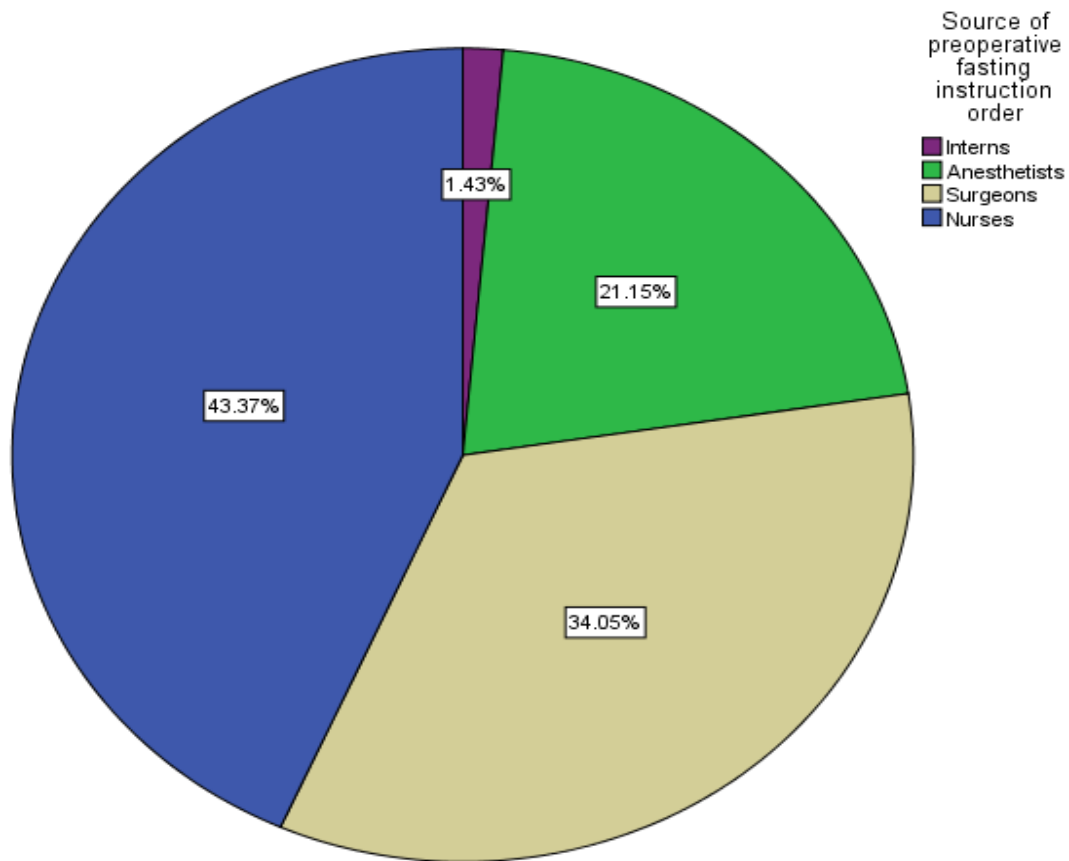


Figure 4. Source of preoperative fasting instructions orders delivery in selected government referral Hospitals, Addis Ababa, 2020.

5.4 Types of procedures and ASA physical status

As regards to the types of the procedures about 114 (40.86%) of the patients were scheduled as general surgery, followed by 68 (24.37%) of them orthopedics surgery and the rest was taken by urology, ENT, and other procedures. Majority of the respondents had ASA physical class status of I (78.85%) and ASA physical status of II (21.15%).

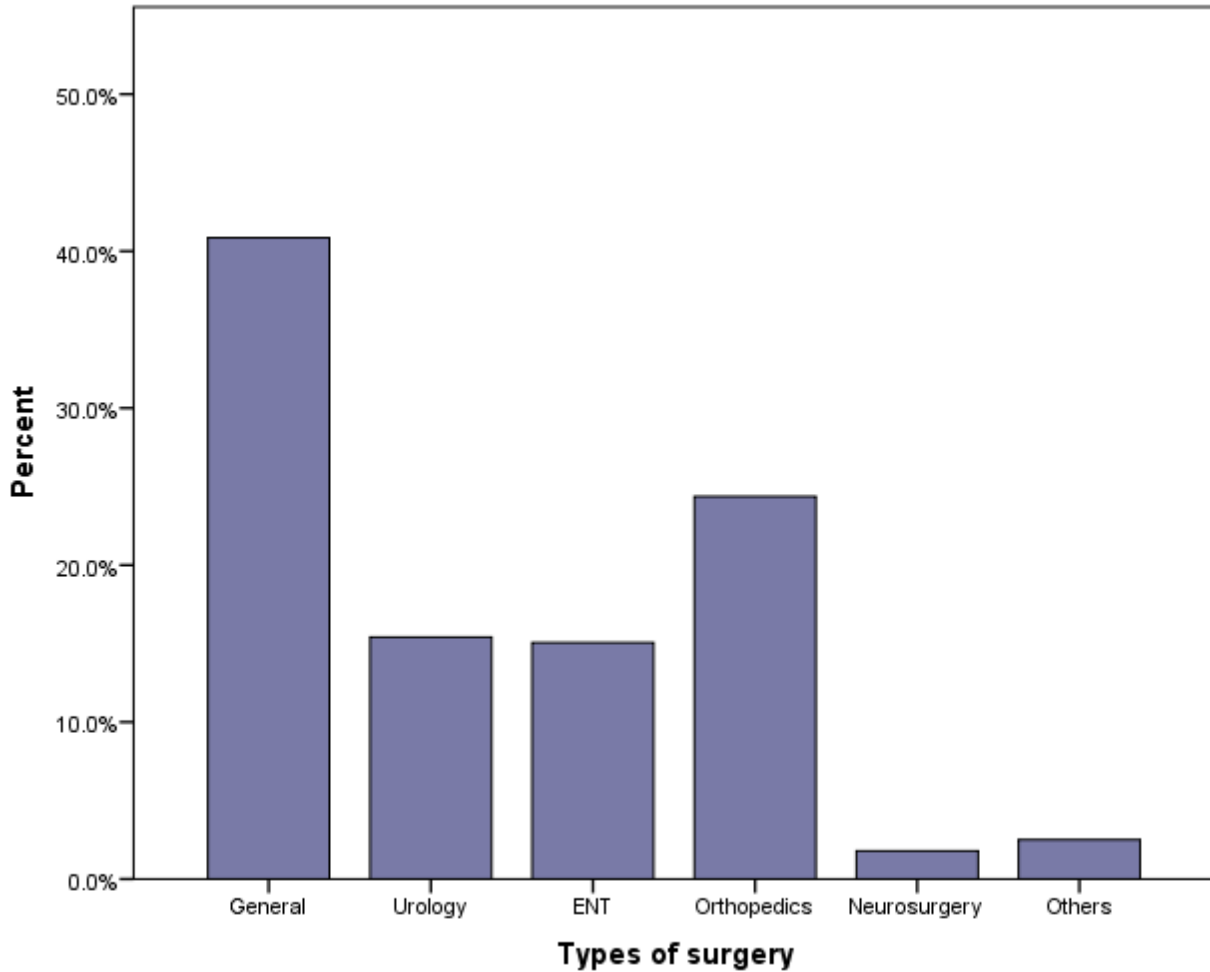


Figure 5. Types of procedures in selected government referral Hospitals, Addis Ababa, 2020.

5.5 Descriptive statistics on fasting time for food for elective pediatrics patients

The study population (n = 279) was comprised of the mean age of 6.55 ± 4.48 years. All participants' last meal instruction times were asked and they reported as the mean NPO hours for clear liquids were 10 ± 4.03 (ranges 2-19 hours). The mean fasting hours for breast milk were 7.18 ± 2.26 (ranges 4-12 hours) and the mean NPO hours for solid foods 13.5 ± 2.76 (ranges 8-19 hours).

5.6 Preoperative fasting hours adherence to guidelines on different food entails

Most of the participants fasted for clear liquids 99 (91.67%) were above the guidelines hours, but only nine (8.33%) them followed the protocol for clear liquids. Out of 279 study participants 44(15.8%) had breast milk feeding and who followed the guidelines were nine (20.45%) and 35 (79.55%) of them did not adhered to the guidelines protocol.

Majority of the participants 117 (92.13%) were not following the guidelines of preoperative fasting protocols for solid foods, whereas ten (7.8%) of the participants adhered to protocols.

Out of the total 279 participants only twenty eight (10.04%) were followed the preoperative fasting international guidelines.

Table 2. Frequency of preoperative fasting hours on different food entails on the study of adherence to pre-operative fasting guidelines in selected government referral Hospitals, Addis Ababa, 2020, (N=279).

Variables	Categories		N (%)	Total %
Preoperative fasting hours	Clear liquids	=<2hrs	9 (8.33%)	108 (38.7%)
		>2hrs	99 (91.67%)	
	Breast milk	=<4hrs	9(20.45%)	44 (15.8%)
		>4hrs	35 (79.55%)	
	Solid foods	=<8hrs	10 (7.87%)	127 (45.5%)
		>8hrs	117 (92.13%)	
Adhere to guidelines	Yes		28(10.04%)	279(100%)
	No		251(89.96%)	

Respondents' frequency percentages that showed (figure 6) majority 251(89.96%) of them were far from the international professional association guidelines. The results showed that adherence for clear liquids (8.33%) and solids (7.87%) were much far than breast milk (20.45%) participants.

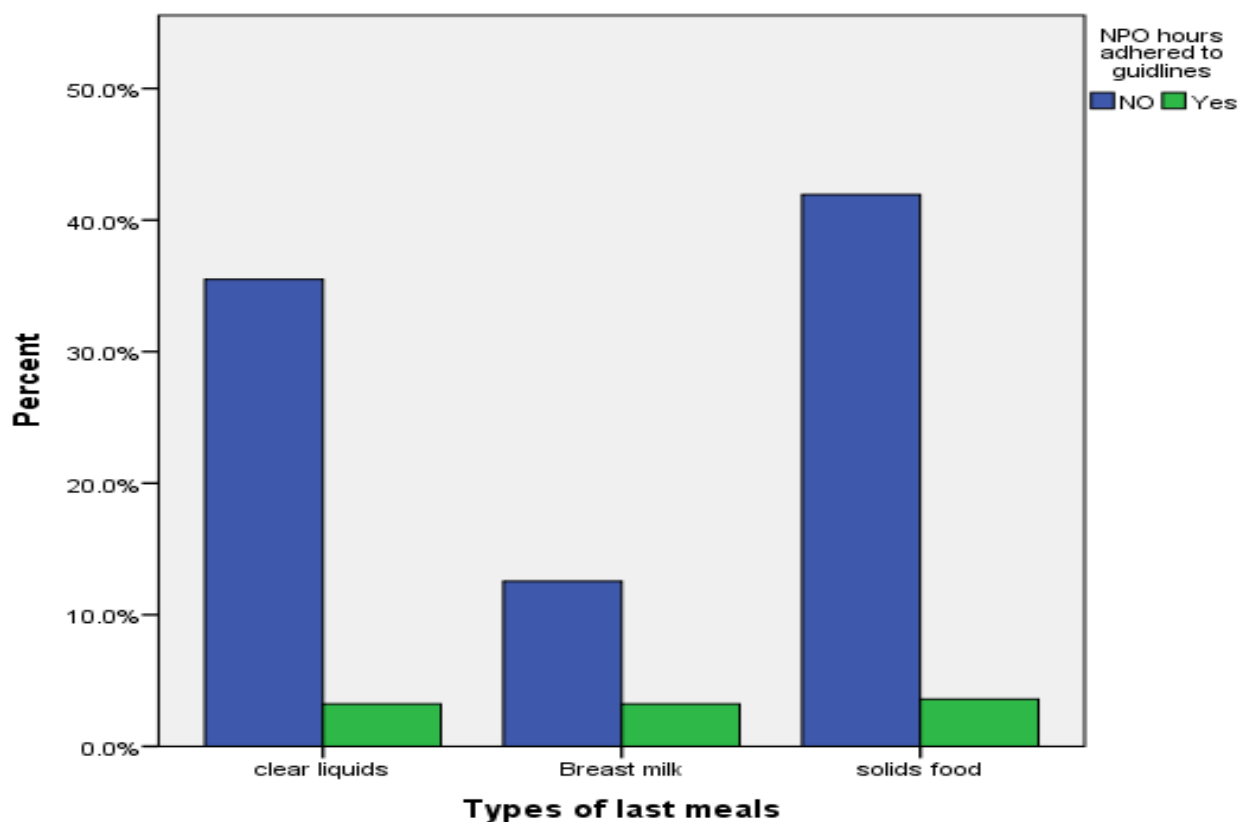


Figure 6. Adherence to pre-operative fasting guidelines in selected government referral Hospitals, Addis Ababa, 2020.

5.7 Preoperative sequence of schedule and reasons of delaying to surgery

From the participants, 75 (26.9%) were scheduled as 1st cases, 81 (29%) as 2nd cases, 73 (26.2%) as 3rd and 50 (17.9%) as 4th cases in daily procedures.

About ninety-eight (35.1%) the respondents reason why the preoperative fasting delayed was due to incorrect order of fasting prescriptions. The second reason was prior cases procedures took longer times 95 (34.1%) to delay the next procedures and changing sequence of schedule in the morning was 58 (20.8%) another reasons. Out of the total study patients only twenty eight (10%) of the patients had an on-time procedures was done.

Table 3. Preoperative cases sequence and reasons of delaying fasting among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, 2020(n=279).

Variables	Categories	Number (%)
Sequence of patients schedule	1 st	75 (26.9%)
	2 nd	81 (29%)
	3 rd	73 (26.2%)
	4 th	50 (17.9%)
Reasons to delayed of fasting time	Prior case procedures takes long times	95 (34.1%)
	Change order of cases sequences	58 (20.8%)
	Incorrect order is given	98 (35.1%)
	Not delayed	28 (10.0%)

5.8 Factors associated with prolonged preoperative fasting

Bivariate analysis

The selected socio-demographic characteristics of the participants' variables such as sex, caregiver relationship, and types of procedures and ASA classes were failed to show statically significant whereas on the bi-variate analysis method participants' age, levels of educations, the sequence of patient's schedule and sources of instruction were significant with P-value < 0.25.

Participants' age was significantly associated with prolonged preoperative fasting. Those patients whose age increases by one year had odds of 11.8% less likely to have a prolonged preoperative fasting p (0.024) [AOR: 0.882, 95% CI (0.791, 0.983)].

Statistical significance was observed with the sequence of patient schedules. Patients who scheduled as 3rd and above cases were 77.7% less likely having prolonged fasting times than cases scheduled as 1st cases p (0.025) [COR: 0.223, 95% CI (0.082, 0.611)]

Statistically significant association was also found between preoperative fasting order instructions was given and adherence of guidelines. The orders given by the surgeons and Interns were 70.2% less likely associated with preoperative fasting prolongation than orders was given by nurses with p (0.037) COD: 0.298, 95% CI [(0.095, 0.928)]

Participants' caregivers' levels of education status primary and above were 59.5% less likely associated with prolonged preoperative fasting than educational levels with illiterate and can read and write p (0.025)[COR , 0.405 , 95%, CI(0.183, 0.894).

Multivariable analysis

Statically significant that found in bivariate analysis is not associated with multivariate analysis, however only sequences of patient schedules as 3rd and above cases were 76.7% less likely statistically associated with 1st and 2nd cases. P (0.006) [AOR: 0.233, 95% CI (0.082, 0.660).

Table 4: Factors associated with adherence to pre-operative fasting guidelines analyzed in binary logistic regression study among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, 2020 (n=279).

Variables		Fasting hours adherence to guidelines		Odds ratio (95% CI)			
		Yes N (%)	No N (%)	Crude (95% CI)	P value	Adjusted (95%CI)	P value
Age	1month -17 years	28(10.04)	251(89.96)	0.864(0.775, 0.962)	0.008*	0.882(0.791, 0.983)	0.024**
Sequence of patient schedule	1 st	14(18.67)	61(81.33)	1.00		1.00	
	2 nd	8(9.87)	73(90.13)	0.477(0.188, 1.214)	0.120*	0.526(0.197, 1.407)	0.201
	3 rd and above	6(4.87)	117(95.13)	0.223(0.082, 0.611)	0.003*	0.233(0.082, 0.660)	0.006**
Levels of caregivers educations	Illiterate and Can read and write	16(15.38)	88(84.62)	1.00		1.00	
	Primary school and above	12(6.86)	163(93.14)	0.405(0.183, 0.894)	0.025*	0.453(0.193, 1.063)	0.069
Sources of preoperative fasting instruction	Nurses	15(12.4)	106(87.6)	1.00		1.00	
	Anesthetists	9(15.25)	50(84.75)	1.27(0.521, 3.104)	0.597	1.406(0.538, 3.672)	0.487
	Surgeons and Interns	4(4.04)	95(95.96)	0.298(0.095, 0.928)	0.037*	0.332(0.101, 1.077)	0.066
Do you know why your child is fasting before anesthesia and surgery	Yes	17(8.46)	184(91.54)	1.00		1.00	
	No	11(14.11)	67(85.89)	1.77(0.79, 3.98)	0.163*	1.37(0.555, 3.397)	0.493

*- bivariate significant, p<0.25

** - multivariate statically significant P<0.05

CHAPTER SIX: DISCUSSION

The results of this study revealed that the importance of pre-operative fasting adherence to guidelines in improving unnecessarily prolonged fasting practices and patients' comfort in the perioperative periods. This was the first survey carried out to assess the preoperative fasting hours in children in our hospitals. This study showed that the majority of participants who were underwent elective surgery (89.96%) had prolonged NPO instructions, whether they are scheduled for an early or late procedure. There is a scarce study on preoperative fasting policy in the hospitals where the study was conducted in children underwent surgery relevant specifically to our country. Our study is similar with the study done at a major teaching hospital in Gondar University majority of patients fasted from both fluid (95 %) and solid food (92 %) longer fasting hours than the recommended by the international fasting guidelines.(18)

Based on our findings, the overall prevalence of preoperative fasting adherence to guidelines was 10.04%. Our study also tried to show this incidence in lines with study done in 96.1% of patients had been reporting preoperative prolonged fasting times.(28) This study also comparable with study done in Japan majority of the patients (90%) fasted from fluid longer than the recommended preoperative fasting hours of the guidelines.(34)

Of the study patients, 8.33% had fasted for clear liquids with following protocol (2hrs). A similar study was done in Pakistan only 2.9% children had fasted for clear liquids according to the recommended fasting time (2 hours).(34) The difference of the study might be due to relatively small samples

The study showed that children who experience excessive fasting times resulting in a lot amount of pre-operative discomfort. The majority of children fasted as instructed were severely hungry, thirsty, anxiety, and drowsiness due to that the times of fasting are still too long.(22) Even though, there may be different reasons behind for extended fasting, including children being fed earlier in the evening and sleeping for longer on the night before.(35) A study was done by Endale G.(2014) showed that 49 % of patients had experienced slight to severe thirst due to prolonged fasting from fluid.(18) This implies that children in waiting of the procedure faced unnecessary stressful and metabolic discomfort. But, several meta-analysis of trials showed that children who were preoperatively fasted more than 6 h from oral fluids did not benefit

intraoperative gastric volume and pH as compared with who were allowed unlimited liquids up to 2 hours before surgery.(36)

This study showed that the mean fasting time to liquids and solids were very higher than ASA recommended. NPO hours for clear liquids were 10 ± 4.03 (Ranges 2-18 hours), the mean hours for breast milk 7.18 ± 2.26 (Ranges 3.5- 12 hours) and the mean hours for solid foods 13.5 ± 2.76 (Ranges 8-19 hours). This study is comparable with the study was done by Cestonaro et al. (2014) showed that 16.5 h of mean fasting hours for solids and 15.75 h for liquids in a university public hospital in the South of Brazil. A study published by Aguilar-Nascimento et al. showed also supported our findings that the median fasting for 13 h (6- 21h) in a group that used the traditional recommendations.(4) Another audit study also found a similar evidence that the conventional preoperative fasting hours were prolonged more than 50 % of the patients fasted twice longer than the guidelines.(18)

Another study indicated that the mean fasting time for clear liquids is 7.65 times and for solids 2.5 times longer than the preoperative fasting times recommended by ASA.(29) Children were being starved of water for a mean of 8.5 hours, which exceeds the recommendations of all international guidelines.(16) A study was done by Arun B. on preoperative fasting hours for solids and milk (breast and nonhuman) was between 4 h and 18.75 h (11.25 ± 3.5 h) and clear liquid (water) ranged between 2 h and 18.75 h (9.25 ± 4.25 h).(20) The actual mean duration of preoperative fasting the patients had for water/ clear fluids was 10.37 hours (range 3-14 hrs) and for light or heavy meals was 11.6 hrs (range 8-14 hrs).(37) Children who had surgery in the morning fasted longer for solids than children who had surgery in the afternoon because of an overnight fast after the evening meal.(30)

Our study showed that sources of instruction orders were given by nurses was 121 (43.37%) followed by surgeons 95 (34.05%) and anesthetists was 59 (21.15%) during in the preoperative visiting time. A similar study of 63.8% of patients had been verbally instructed by anesthetists regarding preoperative fasting and 97.9% by nurses respectively.(37) The study regarding fasting instructions delivery reports to patients was by nurses (56.9 %) and by doctors (43.1 %).(29) . The difference may be the sources of instruction delivered by different groups.

Our study reported that the reasons for delayed of fasting times 98 (35.1%) were due to incorrect order of fasting instructions given by staff. The other reason to delay fasting time was prior case

procedures take longer times 95 (34.1%) and changing sequence of schedule lists in the morning was 58 (20.8%). Studies comparing our findings showed that 59.5% of the previous case taking longer times than scheduled was the most frequent reason for prolonged patient fasting time followed by case order of sequence changes (14.3%). Still, there is prolonged fasting which can be caused by changes to the list order or the addition of emergency cases. (11) This also might be the reasons for our cases. A study was done by Arun, B. showed that rescheduling of cases 30% and incorrect nurses' order 74% were the causes for delayed fasting time.(20) Another study confirmed none of the patients was given information which is used for preoperative fasting guidelines.(18) Therefore this shows that incorrect orders of instructions and changing sequences of cases schedule with inadequate information delivery still challenged the fasting practice.

Our study findings also shared the challenges to evidence by an audit was done in Ethiopia about the implementation of fasting guidelines are lack of fasting protocol at national as well as local level, lack of knowledge about the benefits of adherence to fasting protocol, the adverse effect of prolonged fasting, lack of auditing in the hospitals, and absence of an initiative committee.(18)

In a teaching hospital like in our study which overemphasizing the teaching may adversely affect the patient experience of fasting. Preoperative case delays much of the times occur in the operating room and majorly affect the patient flow, resource utilization, and unnecessary cancellation and rescheduled if there is no enough time left in the day to finish the surgery.(11) (37)

In this study, we observed that traditional nil per oral (NPO) instructions after midnight for clear liquids, breast milk, and solids which inadvertently leads to prolonged fasting. This may explain the reason despite reasonable evidence; anesthetists still need 2:4:6 rules for fasting in children.

The sequence of patients scheduled time and the fasting instruction with the time of the proposed procedure should be coordinated. Staff in the preoperative visit should check the sequences of lists before delivering fasting instructions which should be harmonized with the time of the procedure.

Strength and Limitation of the research

The strength of our study is that we have study in multicenter with large samples of studies compare to others studies and we are including all pediatrics age groups with regards to the three food entails (clear liquids, solids and breast milk).

The main thing that we suppose as a limitation from our study is shortage of adequate references to compare the associated factors that prolong fasting.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1 Conclusions

In conclusion, we found that fasting times for pediatric patients in our study were typically far longer than current guidelines. Sequence of patients schedule and instructions delivered by staffs were the causes of unnecessary prolonged fasting experiences in children.

7.2 Recommendation

The dogma of NPO after midnight still practiced, despite the overwhelming evidence of safety and benefits in reducing preoperative fasting time for children. The impact of this prolonged fasting reduce with adopts adherence to the guidelines.

So we need a plan to look again at guidelines that may guide children to be given fluids after schedule lists but before anaesthesia. This helps us to adjust fasting times according to position on the operating list, and prescribing again.

Develop a trend by surgeons, anesthesiologists, and nurses to revise the schedule lists in the morning. Then the patients should have an order to take a solid or fluid whenever the surgery delayed. For better recovery and the patient's well-being, we reinforce that it is necessary to establish a preoperative fasting abbreviation protocol

For health care providers: Practice and evaluate preoperative fasting practices adherence within institution and communicate with other departments for good management.

For hospital management bodies: We suggest that the Hospitals should set up preoperative fasting policies and train the staffs that should ensure consistence with the protocols on regular basis.

For researchers: we recommend researchers to carry out additional study on practice of fasting and factors that prolonged the fasting time information about the guidelines and the benefit of adherence by using prospective follow up studying.

We also suggest them to investigate attitudes of the patients and staffs why not follow the guidelines.

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Annexes

Annex I: Information and Consent Form

Information sheet:

This questionnaire is designed to assess **Pre-operative fasting adherence to guidelines and associated factors among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, Ethiopia, 2020**. I am going to conduct Preoperative fasting adherence to guidelines and associated factors among elective pediatric surgical patients. There is no risk to take part in the study, all information is confidential. Their names will not keep in the form. Their participation in the study will be voluntary: They are not obliged to participate and may discontinue at any time. Moreover, this research thesis is approved by Ethical review board of AAU and college of health science, department of Anesthesia.

Consent Form

Hello! Good morning/afternoon? My name is Aragaw Hamza I am here today to collect data on the Pre-operative fasting adherence to guidelines and associated factors among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, Ethiopia, 2019/2020. The objective of this questionnaire is to assess Pre-operative fasting adherence to guidelines and associated factors among pediatric surgical patients in selected government referral Hospitals, Addis Ababa, Ethiopia, 2019/2020.

Your correct and genuine response or answer to the questions can make the study achieve its goal. Therefore, you are kindly requested to respond very voluntary with patience. The questionnaire may take 10 to 15 minutes. We assure you that this study is surely confidential, thus writing your name is not needed. Are you willing to participate in answering the questionnaire?

Yes!

Go to the next page.

Annex II: Amharic information sheet

**አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ ህክምና ትምህርት ቤት፣ የአንስቴዥያ ትምህርት ክፍል
የመጠይቅ ፈቃደኝነት ቅጽ**

ስሜ _____ ይባላል።እኔ በአዲስ አበባ ዩኒቨርሲቲ በአንስቴዥያ ትምህርት ክፍል የምርምር ቡድን ዉስጥ አንድ አባል ነኝ።የዚህ መጠይቅ አላማ ልጆች ከአፕራሲዎን ከማዳረጋቸዉ በፊት ከምግብ እና ፍሳሽ ምግቦች መከልከል(መጸም) እና ተያይዞ ያሉ ምክንያቶች መመሪያዎችን ከማክበርዎ ጋር ለመጠየቅ ወይም መረጃ መሰብሰብ ነው።እርስዎን አንድ የጥናቱ ክፍል አድርጌ ስመርጠዎ አስፈላጊ የሆኑ መረጃዎችን እንደማገኝ በማሰብ ነዉ።በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ከእርስዎ የሚገኘው-ማንኛውም መረጃ በ ሚስጥር ይጠበቃል።ለዚህም ሲባል የእርስዎ ሥምም ሆነ አድራሻ አይገለጽም።

የእርስዎ ፈቃደኝነት ልጆች ከአፕራሲዎን ከማዳረጋቸዉ በፊት ከምግብ እና ፍሳሽ ምግቦች በመከልከል መመሪያዎችን ማክበርዎን ወይም አለማክበርዎን እና ምክንያቶቹን ለማወቅ ይረዳል።

የቃል ሥምምነት

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሳተፍ

ሀ. ፈቃደኛ ሆኛለሁ ለ. ፈቃደኛ አይደለሁም

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ፡-

የመጠይቁ መለያ ቁጥር _____ መጠይቁ የተካሄደበት ቀን _____

የጠያቂው ሥምና ፊርማ _____

የሱፐርቫይዘር ስምና ፊርማ _____

ጥናቱን በተመለከተ ማንኛውም አይነት ጥያቄ ካላችሁ የሚከተለዉን አድራሻ ተጠቀሙ።

በዋናነት ምርምሩን የሚያካሂዉ ሰዉ ስም :

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Annex III. Questionnaires checklists

Part I: Questions on Socio demographic characteristics

S.NO	Question	Possible responses	Remark
101	Patients Age (in year)	
102	Sex	1. Male 2. Female	
103	Care givers relationship	1.Mother 2.Father 3.Others	
104	Level of education of care givers	A. Illiterate B. Can read and write C. Primary school (1-8) D. Secondary school (9-12) E. College and above	

Part: II Questions on perception caregivers on preoperative fasting.

201	Do you know why your child is fasting before anesthesia/surgery?	1. Yes 2. No	
202	If your answer is Yes, for the above question what are the reasons for fasting before surgery?	1. Avoiding vomiting 2. Requirement of surgery 3. Prevent anesthesia complications 4. Food may obstruct Airways 5. Avoid sugar level during surgery	

Part: III Questions on source of preoperative fasting instructions

S.NO	Questions	Possible responses	Remark
301	Source of preoperative fasting instruction/order	1. Nurses 2. Anesthetists 3. Surgeons 4. Interns	

Part: IV Questions on Types of procedures

S.NO	Questions	Possible responses	Remark
401	ASA physical status	ASA 1 2 3 4 5 6	
402	Types of surgery	8. General 9. Urology 10. ENT 11. Orthopedics 12. Neurosurgery 13. Others	

Part: V Questions on preoperative fasting orders

501	Preoperative fasting time started	1. Clear liquids(water, pulp-free juice and tea or coffee without milk) --(am/pm) 2. Breast milk.....(am/pm) 3. Solid foods.....(am/pm)	
502	Time of anesthesia is started(am/pm)	
503	Sequence of patients schedule	1 st 2 nd 3 rd 4 th 5 th 6 th 7 th	
504	Delayed of fasting time due to.	1. Prior case procedures takes long times 2. Change order of cases sequences 3. Incorrect order is given 4. Not yet delayed	

Annex IV. Fasting guidelines

Summary of the American Society of Anesthesiologists Preoperative Fasting Guidelines for Healthy Patients of All Ages, 2017

Ingested Material	Minimum Fasting Period (hrs.)
Clear liquids	2
Breast milk	4
Infant formula and Nonhuman milk	6
Light and regular meal	8