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College of Health Sciences

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Assessment of post-operative pain management in pediatrics patients in Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia 2024 G.C

A thesis submitted to Addis Ababa University College of Health Sciences, department of Anesthesiology, Critical Care, and Pain Medicine in Partial Fulfillment of the requirements for the specialty program of Anesthesiology Critical Care and Pain Medicine (ACCPM).

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Assessment of post-operative pain management in pediatrics in Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia 2024 G.C

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ABBREVIATIONS AND ACRONYMS

AOR:	Adjusted Odds Ratio
ACCPM:	Anesthesia, critical care, and pain medicine
COR:	Crude Odds Ratio
ESPA:	European Society of Pediatric Anesthesia
FLACC:	Face, Leg, Activity, Cry, and Consolability
NICU:	Neonatal Intensive Care Unit
NRS:	Numerical Rating Scale
NSAID:	Non-steroidal Anti-inflammatory drug
PCM:	Paracetamol
PE:	Pediatrics Emergency
PO:	Per Os
PRN:	Per needed
SPHMMC:	Saint Paul's Hospital Millennium Medical College
SNS:	Sympathetic Nervous System
TASH:	Tikur Anbesa Specialized Hospital
VAS:	Visual Analog Scale
WHO:	World Health Organization

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ABSTRACT

Background: Understanding the pathophysiology of pain and performing age appropriate pain assessment tools will help create goal oriented pain treatment plans and better pain control in children. Anticipating and effectively treating pain in pediatric patients is an essential component of care. Inadequately treated pain will lead to multiple morbidity and increased mortality. The goal of this study is to assess practice of pain management within the first 24 postoperative hours.

Objective: Assessment of post-operative pain management in pediatrics patients aged 1-14 years at Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia 2024 G.C.

Method: An institutional-based descriptive cross-sectional study was conducted over 4 months utilizing a semi-structured questionnaire and age appropriate pain assessment tools. The Face, Leg, Activity, Cry and Consolability (FLACC) scale and Visual Analog Scale (VAS) were used to measure pain intensity. Additional data was collected from respective medical chart. A total of 160 patients were included in the study and data was cleaned, coded and entered to SPSS version 27 for analysis. Bivariate and multivariable multinomial logistic regression analysis was done to assess factors affecting severity of pain; $P< 0.05$ was used to declare significant variable.

Result: The prevalence of pain in the study was 70%. The mean pain score was 2.3. Mild, moderate, and severe pain scores were 41.9%, 14%, and 10.6% respectively. The most commonly prescribed medications were non narcotics. There was no use of standard pain assessment tool. Children under 7 years pain (AOR = 0.206, 95% CI: 0.050-0.841), those receiving narcotic analgesics (AOR = 0.094, 95% CI: 0.017-0.504) and on scheduled prescription (AOR = 0.182, 95% CI: 0.039-0.863) had lower odds of experiencing severe pain.

Conclusion: There is high prevalence of pain in pediatric post-operative patients. In TASH, there is poor evaluation, documentation, reassessing, and treatment of pain. The study highlights the importance of considering age, medication type, and prescription patterns in managing post-operative pain in the pediatric population.

Key words: pediatrics, pain, TASH, post-operative, surgery.

1. INTRODUCTION

1.1. Background

Pain is an unpleasant feeling and an emotional experience brought on by tissue damage, whether it is real or imagined, or it can be conceptualized as such. This makes it clear that it is subjective and that developmental, genetic, psychosocial, and cultural factors all play a role (1). People of all ages can be affected, despite the possibility of different clinical manifestations. Pediatric pain has historically received less attention than adult pain, and symptoms may have other causes. Using age-appropriate pain assessment tools and understanding the pathophysiology of pain can lead to goal-oriented pain treatment plans and improved pain control in children. One or more of the perioperative pathophysiology, such as elevated neuroendocrine stress response, increased sympathetic nervous system (SNS) activation, decreased respiratory function, attenuated spinal reflexes, and the potential for developing chronic pain syndromes, are exacerbated by poorly managed pain following surgery(2). Pain management for pediatric patients requires anticipating and effectively managing pain as a critical part of care. It is therefore designated as "the fifth vital sign" by the World Health Organization (WHO). Pain can be measured and appropriate action taken by the healthcare provider through a meticulous evaluation conducted by age-specific pain scoring systems.

Due to the significant increase in research on the evaluation and treatment of pain in infants and children, a wide range of behavioral, physiological, and psychological techniques are now available for measuring pain in children (1). Pediatric pain measurement presents unique challenges due to the impact of developmental factors, past pain experiences, and parental attitudes on children's expressions and perceptions of pain (1). Pain assessment must be incorporated into perioperative care and every heath personnel involved in the management should develop competency in the assessment and treatment of pain in children. Practice guidelines and standards at a hospital level or national protocols should be set to facilitate pain assessment at regular intervals with age-appropriate tools. pain assessment is a multifaceted observational evaluation of a patient's experience of pain whereas pain measurement tools are Instruments intended to measure pain (2).

There are multiple pediatric assessment tools; such as Neonatal/Infant Pain Scale (NIPS), Neonatal Pain, Agitation, and Sedation Scale (N-PASS), CRIES, Neonatal Facial Coding System (NFCS), Faces, Legs, Activity, Cry and Consolability (FLACC), Revised-FLACC, Children's Hospital of Eastern Ontario Pain Scale (CHEOPS), Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Wong-Baker Faces scale and Non Communicating Children's Pain Checklist (NCCPC-R)

Pain is multidimensional. Therefore assessment must include elements that might shape how the child perceives it, including biological, psychological, and social components. Therefore evaluation should include intensity, location, duration and description, the impact on activity and the factors that may influence the child's perception of pain (bio psychosocial phenomenon). When evaluating a patient the following crucial issues should be considered: cognitive ability, environment (hospital), anxiety, and cause of pain (e.g. following surgery). Assessing pediatric pain becomes especially challenging with pre-verbal children and those with developmental disabilities. The subjective and complex nature of pain poses significant hurdles in evaluating it in infants and toddlers (3). Their reliance on others for assessment, along with their limited language, understanding, and ability to express pain contextually, can impede both assessment and subsequent intervention. Additionally, distinguishing between pain, anxiety, and distress in some children can further complicate the process. When acute pain is not treated effectively, it can lead to a number of negative effects on the patient's health, such as increased hospital stay, altered brain development, delay healing, progressing to chronic pain and increase the risk of opioid addiction later in life.

There are different practices among countries in pediatric pain management. European Society of Pediatric anesthesiology (ESPA) advocates a goal of acceptable pain score in pain management in all institutions including institutions with limited resource area. The ladder stresses initiating with the minimum invasive treatments and mounting as necessary based on the severity of the pain. The management is encapsulated on the type of surgery, intensity of pain, and type of medication.(4) In Africa, the South Africa applies WHO guidelines on the pharmacologic treatment and a local guideline in most patients. Despite a proper guideline, there was violation of intramuscular morphine administration (5). Studies conducted in

Ethiopia showed choice of analgesics was not in harmony with the WHO's pain management ladder. Some patients experiencing severe pain were only treated by paracetamol (6). In general, patients who receive inadequate pain management have higher rates of morbidity and death. pain alleviation after surgery utilizing different types of analgesic regimens, may decrease these complications (7).

1.2. Statement of the Problem

There are multiple surgeries done in Tikur Anbesa Specialized Hospital (TASH) as inpatient cases. In spite of the provided service, standard pediatric pain assessment is not done and recorded on the charts. Patient and family perceptions towards pain also impacts the reporting and scoring in pain assessment.

A study conducted at this hospital revealed despite complaints of pain from patients or caregivers, proper pain management is not provided because of obstacles including healthcare professionals' attitudes, beliefs, and knowledge about pain management (8). There are limitations in prescribing and administering narcotics for fear of adverse effects. These and other multiple factors lead to poor pain assessment and intervention that will lead the patient to increased risk for morbidity and mortality.

Studies conducted in Ethiopia showed choice of analgesics was not in harmony with the WHO's pain management ladder. Some patients experiencing severe pain were only treated by paracetamol (6). In general, patients who receive inadequate pain management have higher rates of morbidity and death. pain alleviation after surgery utilizing different types of analgesic regimens, may decrease these complications (7).

Therefore, this study is aimed to evaluate the pain management practice and the factors associated with in post-operative pediatrics patients aged 1-14 years at Tikur Anbesa Specialized Hospital

1.3. Significance of the study

Since children may struggle to express their pain effectively, it's essential to have easily accessible tools for assessing their pain levels to gauge the severity of their discomfort. This research holds importance in identifying potential shortcomings in how pain is managed at

TASH. It highlights a significant deficiency in the way pediatric pain is assessed and documented in patient records. Additionally, it emphasizes the influence of patient and family perspectives on how pain is reported, stressing the complex process of pain assessment and treatment.

The study's results could reveal the challenges healthcare providers encounter in delivering sufficient pain management, including issues related to attitudes, beliefs, and gaps in knowledge. Ultimately, addressing these issues is imperative as they contribute to poor pain assessment and intervention, thereby elevating the risk of morbidity and mortality among patients. By explaining these encounters, the study can pave the way for targeted interventions and educational initiatives aimed at enhancing pain management practices and ultimately improving patient outcomes in the hospital setting. Despite the scale of the problem, adequate studies were not done in this hospital on assessment of practice of post-operative pain management in the first 24 hour. As a result, this research weighs the magnitude of the problem and highlights the possible solutions and be a stepping stone for future researchers.

2. LITERATURE REVIEW

2.1. Prevalence of pain and pain management

Numerous studies have been done worldwide in pediatric pain assessment and. Many indicate it is under recognized, insufficiently assessed, and not adequately treated. One such study was carried out in Canada, Nova Scotia in 197-bed institution serving a metropolitan area. The sample included all hospitalized patients excluding neonates and psychiatry patients. The survey included parents of children under five years old and the patients themselves if aged five and above. Forty nine percent of subjects reported worst pain scores in the clinically significant range. Interestingly, children were administered remarkably less medication than what was prescribed, regardless of the pain levels they reported.(9)

A subsequent study directed by Flinders University and the Flinders Medical Centre in South Australia, across two major teaching hospitals, surveyed the prevalence of pain in 170 postop patients. Results indicated that 53% of patients' informed feeling pain, with 17% of them

described it as severe within the first postoperative day. Interestingly, analgesic medication was not prescribed for 16% of patients, and 39% did not obtain the prescribed narcotic medication. Moreover, in 29% of cases where an order was written for "narcotic or non-narcotic analgesic medication," only the non-narcotic drug was given. Despite the pain management, only 25% of the patients were pain free on the day of surgery and 13% reported severe pain (10).

A retrospective analysis conducted at the Medical University of Graz, University of Graz, Auenbruggerplatz, Austria, found that from the 815 children and adolescents analyzed 36% of them suffered clinically significant pain (≥ 4) throughout their hospital stay(11)

In Brazil, a cross-sectional study on pediatric pain: prevalence, assessment and treatment was conducted in a public teaching hospital, consisting of a sample of 121 inpatients (70 infants, 36 children and 15 adolescents), their families, 40 physicians, and 43 nurses. 34 children/adolescents (28%) answered the questionnaire and for the other 72% (unable to communicate), the family/health professional caregivers reported pain. Among these 34 persons, 20 children/adolescents reported pain, 68% of whom reported they received pharmacological intervention for pain relief. 82 family caregivers were available on the day of data collection. Of these, 40 family caregivers (49%) had observed their child's pain response. In addition, 74% reported that hospitalized patients received pharmacological treatment. Physicians reported that only 38% of the inpatients exhibited pain signs, which were predominantly acute pain detected during clinical procedures. They reported that 66% of patients received pharmacological intervention. The nurses reported pain signs in 50% of the inpatients, which were detected during clinical procedures. The nurses reported that pain was managed in 78% of inpatients by using pharmacological and/or non-pharmacological interventions. The results demonstrate the high prevalence of pain in pediatric inpatients and the under recognition of pain by healthcare professionals(12)

The problem is more deep rooted in resource limited countries where both knowledge and assessment tools are inadequate. A single-day prospective observational cross-sectional survey and medical chart review was done in pediatric inpatients at Grey's Hospital, Pietermaritzburg, South Africa. Sixty-three children were included, and mean patient age was 9.7 years (SD 6.17). Most patients (87%) had pain during admission. At the time of the

study, 25% had pain (median pain score 6/10). The worst pain reported was from needle procedures, including blood draws, injections, and venous cannulation (34%), followed by surgery (22%), acute illness/infection (18%), and other procedures (14%).(3)

Another study was conducted at the Rahima Moosa Mother and Child Hospital (RMMCH) in Johannesburg on 74 children aged between 3 days and 4 years. Male patients comprised for 58% of the cohort. The prevalence of pain at admission was 73% (n=53). Eight percent (n=6) of the study sample had pain evaluation at admission, and only 1 child had been evaluated for pain within the preceding 24 hours. Of the 74 patients reviewed, 10% (n=7) received appropriate analgesia. Paracetamol was administered to 31% of patients (n=23), either for fever or for an undocumented indication. More than half of the study sample (59%; n=44) received no analgesia. (13)

At the Queen Elizabeth Central Hospital in Blantyre, Malawi, a nurse educator conducted a clinical observation from 2007 to 2009 and found absence of pain assessment and management protocols. The cultural disparities in how children express pain in Malawi were noteworthy. There were the differences in attitudes, opinion, and training regarding pain report, all of which likely influence how pain is perceived and treated. Parental expectations and social norms could influence children's reports of pain, either encouraging them to avoid or accept it. Effective pain assessment methods in Sub-Saharan Africa depend on stablishing appropriate tools along with organized education and training. It was determined that healthcare professionals in Malawi need education and confidence in both self-reporting and observational pain assessment. Dispelling myths and misconceptions is indispensable to enable interventions and expand pain management practices (14).

In Ethiopia, a study was conducted at St. Paul's Millennium medical college for pediatric emergency, Addis Ababa using institutional based cross-sectional study from April to June, 2018. Over a 3 month period, using semi-structured questionnaire & age appropriate pain assessment tools, of the 290 children, 206 (71%) were aged 1- 47 months. Male to female ratio was 1.4:1 with males comprising 57.9% of the total study population. The majority of children, 224 (77.2%) had their mothers as primary care giver. Overall prevalence of pain among children admitted to pediatric emergency was 76.2%; mild to moderate pain was reported by 70% of the children and 6.2% had severe pain based on the age appropriate

assessment tools. Of these, the use of analgesics was documented on the prescription sheet in only 21.3%, and the use of analgesics was documented in the care sheet for only 7.2% of the children.(6)

Another prospective study was done from January 2023 to April 2023 on a cohort of 235 pediatric postoperative patients aged 2 month-7 years at selected public hospitals in Addis Ababa, Ethiopia. The pain severity was assessed using age appropriate pain scoring methods at 12, 24, and 36 hours after surgery. With adjusted odds ratio and a confidence interval of 95% and a cut off p value of 0.05, they found that incidence was 36.6%, 20%, and 10% at 12,24, and 36 hours. Major and longer duration of surgery were main predictors of post of pain. And patients put on multimodal analgesia seem to have better pain control with CI= 0.091, 0.652, AOR=0.24. The study concluded that patients tend to have severe pain score in the first 24 hour and pain assessment practices and pain management were the most modifiable predictors (15)

2.2. Factor associated with pain

A retrospective analysis conducted at the Medical University of Graz, University of Graz, Auenbruggerplatz, Austria, found that patients slightly increased on day 1 after surgery. In self-reported pain intensity rating (done for patients' age ≥ 4 years) the type of surgery ($p < .001$) was the only significant variable influencing pain intensity. In observational pain assessment (age < 4 years) pain scores increased with patient's age ($p = .004$). In this patient group, pain intensity ratings did not differ between types of surgery ($p = .278$). The study concluded that while the type of surgery strongly foretells self-reported pain intensity in older children, it does not significantly affect observational pain assessments in younger children (11).

According to a prospective observational cross-sectional survey and medical chart review was done in pediatric inpatients at Grey's Hospital, Pietermaritzburg, South Africa, the worst pain reported was from needle procedures, including blood draws, injections, and venous cannulation (34%), followed by surgery (22%), acute illness/infection (18%), and other procedures (14%). Pharmacological treatments included WHO step 1 (paracetamol and ibuprofen) and step 2 (tramadol, tilidine, and morphine) analgesics. The most effective integrative interventions were distraction, swaddling, and caregiver participation. Their

conclusion from the study was the prevalence of pain in hospitalized children in a large South African Hospital was high and pain assessment was inadequately documented.(3)

Another study was conducted at the Rahima Moosa Mother and Child Hospital (RMMCH) in Johannesburg on 74 children aged between 3 days and 4 years. The presence of pain, both by caregiver report (p=0.62) and by pain score (p=0.074), was not associated with the administration of analgesia. The result of the study was inadequate pain management in all the four domains of assessment, intervention, reassessment and ongoing management. (13)

A Cross-Sectional Follow-up Study on Prevalence and Contributing Factors Associated with Postoperative Pain in Pediatric Patients done at Gondar Comprehensive Specialized Hospital was conducted on 153 pediatric patients aged 2 to 12 years. Preoperative anxiety, history of preoperative pain, type of surgery and incision length were significantly associated with postoperative pain (AOR: 3.41, 95% CI: 1.08, 10.77) (16).

Another prospective study was done from January 2023 to April 2023 on a cohort of 235 pediatric postoperative patients aged 2 month-7 years at selected public hospitals in Addis Ababa, Ethiopia. With adjusted odds ratio and a confidence interval of 95% and a cut off p value of 0.05, they found that incidence was 36.6%, 20%, and 10% at 12,24, and 36 hours. Major and longer duration of surgery were main predictors of post of pain. And patients put on multimodal analgesia seem to have better pain control with CI= 0.091, 0.652, AOR=0.24. The study concluded that patients tend to have severe pain score in the first 24 hour and pain assessment practices and pain management were the most modifiable predictors (15)

In conclusion, all studies done showed pediatric pain is almost not assessed adequately, not thoroughly treated due to different factors and can say it has been neglected especially in Sub-Saharan countries. It is burning issue regarding provision of adequate health care.

3. OBJECTIVE OF THE STUDY

3.1. General objective:

The main aim of the study is to assess post-operative pain management in the first 24 hour in pediatrics at Tikur Anbesa Specialized Hospital, Addis Ababa Ethiopia 2024.

3.2. Specific objective:

- To assess practice of pain management
- To assess prevalence of pain
- To identify factors that lead to inadequate pain management
- To assess the availability and utilization of pain assessment tools specifically tailored for pediatric post-operative care within the hospital setting.

4. METHODS AND MATERIALS

4.1. Study area and period

The study was conducted at Tikur Anbesa Specialized Hospital. It is the largest specialized hospital in Ethiopia, with over 700 beds, and serves as a training center for undergraduate and postgraduate medical students and other health students. It has 4 major operation theaters including the emergency services with 17 operation tables. There is one elective pediatric surgery table in which about 700 cases are operated annually. The Study was conducted from Nov 2023-Feb 2024.

4.2. Study design:

Institution based cross-sectional design was used for this study.

4.3. Population

Source population: all pediatric post op patients in TASH from Nov 2023-Feb 2024

Study population: pediatric patients aged 1-14 years who are in the first 24 hour postoperative period in TASH. To refine the scope of data collection and optimize resource allocation, age was restricted to above one year as this age group requires different tool for pain assessment. Age 14 is the limit for admission to pediatric surgical ward.

4.4. Inclusion and exclusion criteria

Inclusion criteria: inpatient pediatric patients age 1-14 who are in the first 24 hour postoperatively.

Exclusion criteria: age < 1 year, developmental delay, psychiatric problem, patients with learning disabilities, outpatient procedure, patients with chronic pain

4.5. Sample size

The sample size was determined by Cochran equation with standard normal deviation at 95% confidence level (1.96), margin of error 5%, and estimated proportion of 0.5 taken as a reference from a similar study done in Gondar Comprehensive and Specialized Hospital (16).

$$n = \frac{Z^2 p(1-p)}{e^2}$$

Where *Z*: Critical value of 95% confidence level of certainly (1.96)

p: estimated proportion of the population

e^2: margin of error between the sample and population.

N_0= 384

Since the sample size is < 10,000, correction factor was calculated by the formula

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$ Where n: adjusted sample size

N - Population size: 240

n= 148

With lost and incomplete questionnaires and non- respondent rate of 10%

The sample size is 160

4.6. Sampling technique:

In this study, consecutive sampling technique was employed due to the nature of the research setting; accessibility of participants within a limited time frame to allow timely collection of data.

4.7. Study variables

4.7.1. Dependent variable:

- Prevalence of pain, level of pain in the first 24 hours

4.7.2. Independent variable:

- Socio demographic characteristics (Age, sex, education, residence etc)
- Types of surgery (procedure),
- Type of the medication,
- Frequency of administration (standing dose vs PRN),

4.8. Operational Definition

- **Pain:** is an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage(17).
- **Acute postoperative pain:** pain that occur immediately after surgery and lasts for 7 days(18)
- **Mild pain:** a score of 1-3
- **Moderate pain:** a score of 4-6
- **Severe pain:** a score of 7-10
- **Break through pain:** a transitory flare of pain that occurs on a background of relatively well-controlled baseline pain and in general is moderate to severe in intensity, comes on quickly, and is of short duration (19).
- **Health care provider**: professionals involved on the management of the patient starting from ward admission to discharge. This includes nurses, interns, Surgeons, fellows, Anesthesiologists.
- **Ward:** a minor or incapacitated person for whom the guardian in responsible for
- **Proxy report of pain behavior/activity change (e.g., family member, caregiver) -** Exposition, description or narration of a caregiver, family member or member from the health team familiar with the behavior of the person, about a change in the behavior explained by e.g pain faces, body position, appetite change.(5)
- **Self-report of intensity using standardized pain scale (e.g., visual analogue scale, numeric rating scale):** Verbal report of conscious and minimally verbal person requested

to quantify their pain using standardized scales appropriate for their age group/clinical condition(5).

4.9. Data Collection Procedure

An interviewer administered questionnaire (closed ended questions) at the end of 24 hours. The questionnaire was prepared in both Amharic and English languages by professional translator. Half day training was given to interns about the objective of the research and how to assess pain and data was collected after informed consent was taken from the participant. A patient > 5 years of age and a parent for age <5 answered a set of questions to determine the level of pain the patient is in and the response after an intervention. Confidentiality was maintained during the process. Pain was assessed by FLACC for patients aged under 5 and with Visual Analog Scale (VAS) for age above 5.

The questionnaire has five sections and was pre-designed after an extensive literature search, adopted and customized for this research. The fist section include demographic back ground of characteristics of the study participants, followed by assessing current pain score and location. The third section consists of the type of analgesics ordered lastly the intervention done for the pain.

4.10. Data quality assurance

Data was collected after informed consent was taken from the participants. Data collection was supervised by primary investigator and observes the data collecting process directly in 10% of the total sample.

4.11. Data processing and analysis

Prior to data analysis, data cleaning was carried out to evaluate outliners, missing values, or inconsistencies. The collected data was analyzed using SPSS software version 27. In descriptive analysis, Continuous data was presented as mean and median. Categorical data was presented as absolute and relative frequencies and the findings are displayed in tables and graphs. Both bivariate and multivariable multinomial logistic regression ere used to identify factors associated with severity of pain(no pain, mild pian, moderate pain and sever pain) . both Crude odds ratio(COR) and Adjusted odds ratio(AOR) were estimated with their

95% confidence interval. Statistical significance was declared considering a p-value less than 0.05, in the multivariable multinomial logistic regression model.

4.12. Ethical consideration

Ethical clearance was obtained from the ethical review board of the department of ACCPM. Parents and legal guardians were approached for the study and gave oral consent prior to participation in the study and consent was obtained from older children in addition to the parent or guardian.

5. RESULT

5.1. Socio demographic characteristics

Out of 200 patients who were operated in the time period between November 2023 and February 2024, a total of 160 pediatric surgical patients were included.

The majority (66.3%) were age below 7 years old with the mean age of the population was 4.98 years ± 0.52. and 109(68.1%) were male and live in urban area. Nearly half 76 (47.5%) of the children were in preschooler as depicted on the following table.

Table 1: Socio-demography characteristics of the postoperative pediatric patients at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

	Categories	**Frequency**	**Percent (%)**
Age	< 7 year	106	66.3
	≥ 7 years	54	33.8
Sex	Female	51	31.9
	Male	109	68.1
Educational status	Preschoolers	76	47.5
	Kindergarten	30	18.8
	1-4 grade	47	29.4
	5-10 grade	6	3.8

	Not in formal education	1	0.6
Current living area	Urban	109	68.1
	Rural	51	31.9

5.2. Admission diagnosis

The majority of admission diagnosis was from cases of genitourinary, followed by abdominal, orthopedics, neurosurgical procedures.

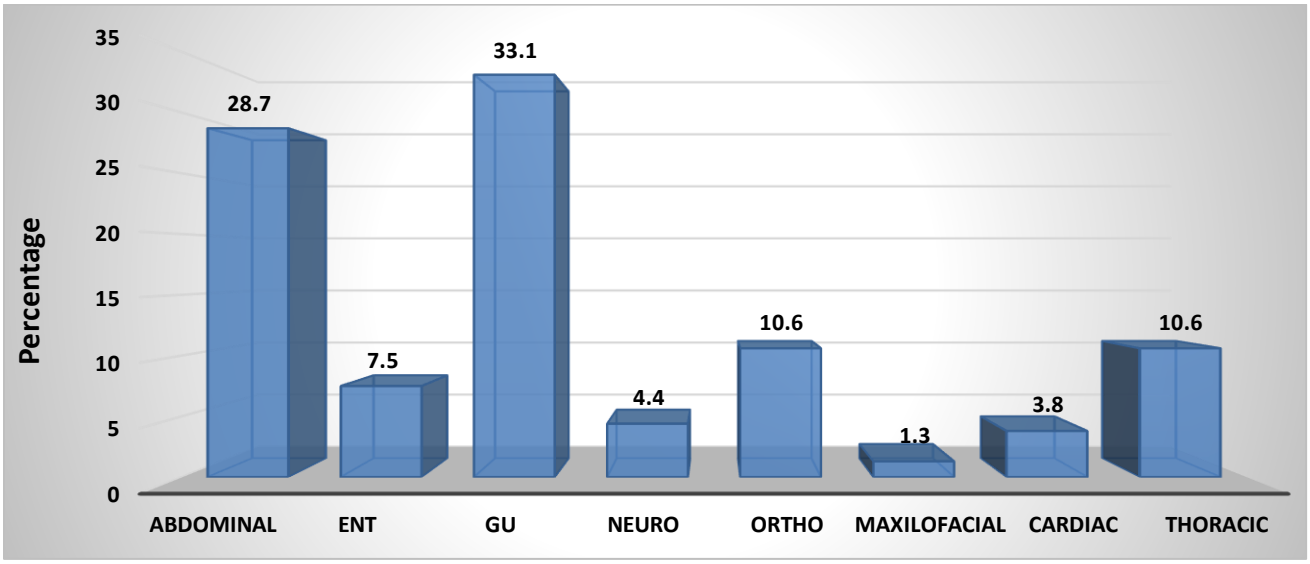


Figure 1: Types of surgeries done between November 2023 and February 2024 in postoperative pediatric patients at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

5.3. Types of surgery

Out of the total participants, majority (66.5%) of the surgery incision was done below umbilicus; abdominal, genitourinary, and orthopedics, while 50 (31.2%) were done above umbilicus; ENT, cardiac, thoracic, neurosurgical, and maxillofacial as anatomical division.

Table 2: Anatomical division of surgery, postoperative pediatric patients at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

Anatomical division of surgery	Frequency	Percentage
Above umbilicus	50	31.2
Below umbilicus	110	68.8

5.4. Pain medication and pharmacologic interventions

Pharmacologic interventions were ordered on order sheet for the vast majority of patients 97.5% (n=156). Furthermore, the study examined whether the prescribed medication was documented on the medication chart. Only 66.9% (n=107) of participants had their medication duly documented on the medication chart, while the rest 33.1% (n=53) of participants did not have their medication documented on the chart.

Regarding the type of pharmacologic interventions, almost all analgesics were ordered by non- anesthesia providers like interns, pediatric residents and respective surgical residents 97% (n= 5). 87.5% of the analgesic orders were on standing dose while the remaining 12.5% were on PRN base. Most patients were prescribed with IV Non-narcotic Paracetamol 86.9% (n=139) while IV Narcotics comprised of 20.0% (n=32). The following table depicts distribution of type of medications. There was no order in plan for breakthrough pain rather depicted as PRN.

Table 3: Type of medications ordered in postoperative pediatric patients at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

Medication ordered	Frequency	Percentage
Yes	156	97.5
No	4	2.5
Documented on chart		
yes	107	66.9
no	53	33.1
Prescription Order of medication		

Standing	140	87.5
PRN	20	12.5
Types of medication		
Narcotics	44	27.5
Non Narcotics	116	72.5
Route of administration		
Non-narcotic pills/syrup: Ibuprofen, PCM	23	13.5
IV Narcotics: Morphine	12	27.5
IV Non-narcotics: IV PCM	139	86.9
Suppositories: PCM	8	5
Narcotic pills	0	0
Family members receive orientation		
Yes	52	32.5
No	108	67.5

The results show that 32.5% of participants received orientation on pain management without the use of medications. But the vast majority of participants 67.5% stated that they were not oriented on non -pharmacologic pain management for their family members.

The study investigated why medications were prescribed but not given in the study population. Financial limitations were responsible for 8.1% of cases. In 5.6% of instances, medication unavailability was reported, suggesting problems with the healthcare facility's supply chain or stock outs. Family member unavailability affected 1.3% of cases, potentially complicating medication administration. 75% of respondents who voiced questions and anxieties about pain noted satisfaction on behalf that the staff acknowledged their inquiries and addressed their worries.

In terms of the patients' use of non-pharmacologic pain management techniques, 13.1% (n=21) of the participants said they used touch (tactile comfort) to reduce their level of discomfort. 16.9 % (n=27) of participants reported conversing or interacting verbally lessen the pain. Eleven percent (n=19) of the participants reported using sleep as a coping

mechanism for their pain. About the use of distraction techniques, 30.6% of participants (n=49) said they used them to get relief from pain. This suggests that a considerable proportion of patients experienced a reduction in pain perception through engaging in activities or stimuli that distracted them. Repositioning oneself to relieve discomfort was reported by 18% (n=30) of the participants. Therefore, 91.3% of patients (n = 146) reported using at least one non-pharmacologic pain management technique, whereas the remaining 8.7% of patients (n = 14) reported using none at all.

5.5. Prevalence of pain in the first 24 postoperative hours

There was no consistent pediatric pain assessment and documentation on frequency of evaluation. During interview, participants were asked to rate their level of discomfort using a scale ranging from no pain to severe pain, with corresponding numerical ranges with FLACC pain scale for age less than five and Visual Analog Scale (VAS) for age above 5. From the 160 pediatric patients during the time period 70% (n=112) of them reported pain. Of the one hundred and twelve patients, 10.6% (n=17) had severe pain. The majority of respondents, comprising 41.9% (n=67), reported experiencing mild pain, which falls within the range of 1-3 on the scale. Following closely, 33.1% (n=53) indicated no pain at all, representing a significant portion of the sample. Meanwhile, 14.4% (n=23) of participants reported experiencing moderate pain, categorizing their discomfort within the range of 4-6 on the scale. The mean pain score was 2.3 (min: 0, max: 9)

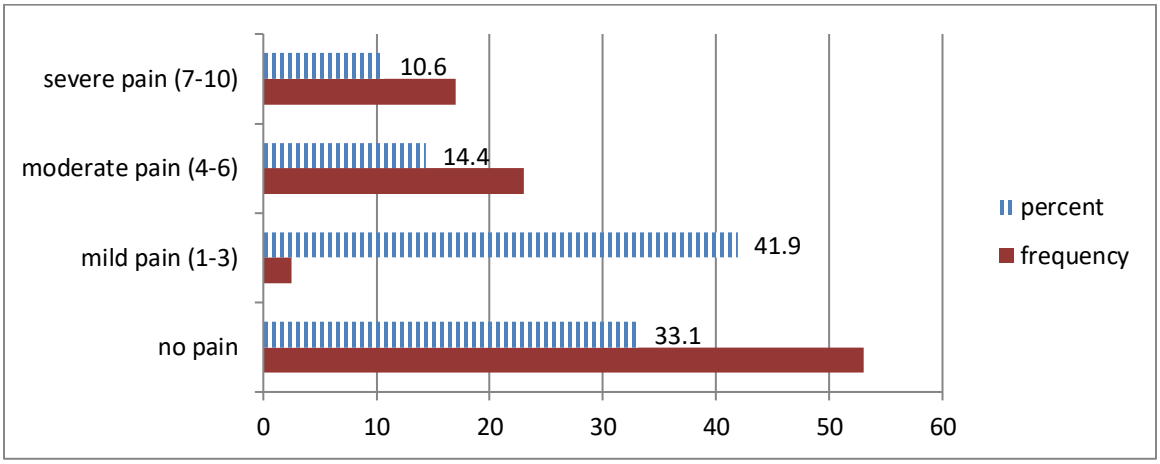


Figure 2. Distribution of pain scale in 2024 in postoperative pediatric patients at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

The study examined the prevalence and nature of pain experienced by patients following surgical procedures, particularly focusing on pain originating from the surgical incision site. Among the surveyed participants, a significant majority 62.5% (n=100) reported experiencing pain specifically associated with surgical incision. This finding underscores the common occurrence of discomfort directly related to the surgical procedure.

Moreover, when exploring the existence of pain from other sources, it was found that a vast majority 94.4% (n=151) of respondents did not report any additional pain beyond the surgical incision site. However, a small percentage of individuals did indicate experiencing pain from other sources, including issues such as constipation, urinary catheterization, and chest tube placement. These findings highlight pain from surgical incisions is prevalent and is typically the primary source of discomfort for patients post-surgery.

Considerable portion of patients 54.4% (n=87) proactively communicated their discomfort to healthcare professionals, emphasizing the importance of patient-provider communication in addressing pain management needs. Though only 28.1% (n=45) of participants reported that their pain was indeed managed by medical staff and the rest 26.3% (n=42), indicated their reported pain was not managed. This indicates a potential gap in pain management practices within the medical setting, underscoring the need for enhanced protocols and interventions to ensure effective pain relief for patients.

5.6. Factors associated with severity of postoperative pain

To identify factor associated with severity of pain among postop children, multinomial logistic regression was conducted with dependent variable level of pain severity of four categories (no pain, mild pain, moderate pain and sever pain). Both bivariate and multivariable multinomial logistic regression was conducted, variable with $P<0.25$ in bivariate model were entered in to multivariate model to adjust for confounding effect. The likelihood ratio chi-square test was used to assess the model's fit, and the results showed that the final model result 126.628 unexplained variance is less than the baseline model (193.995). The change is significant ($P<0.05$), indicating that an important amount of the initial variability indicting the model's fit is explained by the final model.

As compared to older age (≥7years), children under 7 years of age had a 78.5% lower risk of experiencing mild postoperative pain(AOR = 0.215, 95% CI: 0.076-0.605, p = 0.004); 85.5% less likely of experiencing moderate postoperative pain(AOR = 0.145, 95% CI: 0.040-0.517, p = 0.003); and had a 79.4% lower chance of experiencing severe postoperative pain(AOR = 0.206, 95% CI: 0.050-0.841, p = 0.028), compared to no pain category, after adjusting for other factors.

Compared to PRN, standing (scheduled) anti pain medications were 87.9% less likely of experiencing moderate pain (AOR = 0.121, 95% CI: 0.027-0.537, p = 0.035); and 81.8% less likely of experiencing severe pain compared to no pain category. (AOR = 0.182, 95% CI: 0.039-0.863, p = 0.032), after adjusting for other factors.

Children who received narcotic medications had an 84.2% lower chance of experiencing mild pain (AOR = 0.158, 95% CI: 0.061-0.409, p = 0.000), 82.6% lower odds (AOR = 0.174, 95% CI: 0.034-0.888, p = 0.005) of experiencing moderate pain compared to those who received non-narcotic medications, and 90.6% lower odds (AOR = 0.094, 95% CI: 0.017-0.504, p = 0.006) of experiencing severe pain compared to no pain category.

Table 4: Multinomial regression for factors of postoperative pain after pediatric surgeries at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia 2024 (n=160)

Level of pain	Factors	Crude odds ratio(95%CI)	Adjusted odds ratio(95%CI)	P-value
Mild (1-3) pain	**Age**			
	< 7 year	.225 (.089 .573)**	.215 (.076 .605)**	.004
	≥7 years	1	1.	.
	Sex			
	Female	3.300 (1.386 7.857)	2.151(.805 5.752)	.127
	Male	1	1.	.
	Prescription of antipain			
	Standing	1.280 (.248 6.615)	1.682 (.291 9.719)	.561
	PRN	1	1.	.
	Medication type			
	Narcotics	.189 (.082 .439)*	.158 (.061 .409)**	.000
	Non Narcotics	1	1.	.
	Anatomic division			
	Above umbilicus	1.867 (.808 4.311)	1.470 (.531 4.068)	.458
	Below umbilicus		.	.
Moderate (4-6) pain	**Age**			
	< 7 year	.139 (.045 .437)**	.145 (.040 .517)**	.003
	≥7 years	1	1.	.
	Sex			
	Female	3.143 (1.044 9.465)*	1.807 (.510 6.405)	.359
	Male	1	1.	.
	Prescription of antipain			
	Standing	.137 (.032 .593)**	.121 (.027 .537)**	.035
	PRN	1	1.	.
	Medication type			
	Narcotics	.144 (.038 .545)	.174 (.034 .888)*	.005
	Non Narcotics	1	1.	.
	Anatomic division			
	Above umbilicus	2.455 (.843 7.146)	2.427 (.658 8.948)	.183
	Below umbilicus	1	1.	.
Severe (7-10) pain	**Age**			
	< 7 year	.171 (.050 .592)**	.206 (.050 .841)*	.028
	≥7 years	1	1.	.
	Sex			
	Female	2.667 (.782 9.089)	1.450 (.356 5.910)	.604
	Male	1	1.	.
	Prescription of anti-pain			
	Standing	.086 .019 .389)**	.182 (.039 .863)*	.032
	PRN	1	1.	.
	Medication type			
	Narcotics	.206 .053 .803)*	.094 (.017 .504)*	.006
	Non Narcotics	1	1.	.
	Anatomic division			
	Above umbilicus	3.394 (1.063 10.836)	4.013 (.963 16.716)	.056
	Below umbilicus	1	1.	.

*Note : The reference category is: no pain., **1**: is reference category for factors; *P<0.05; **P<0.01*

6. DISCUSSION

The study identified the level of pain and factors affecting severity of pain among postop children. Majority (66.9%) of patients encountered pain during the initial postoperative period, with clinically significant pain (moderate and severe pain) observed in 25% of the population. In comparison to a study conducted at a teaching hospital in Brazil, the prevalence of pain has increased by nearly 3% (12). Another study conducted at a single center in Graz, Austria, also revealed that 62% of patients experienced pain during their hospital stay, with 21% reporting clinically significant pain (11).Therefore, the level of postoperative pain experienced by children and adolescents in our study exceeded the typical rates reported in existing literature. This outcome accentuates higher and unacceptable degree of pain experienced during hospitalization.

Although the majority of study participants reported having pain at some point throughout the study period, this percentage is less than that of SPHMMC, where 97.9% of participants reported having pain(6). 10.6% and 14.4% of the participants in our research, respectively, reported moderate to severe pain. According to a research done at a Canadian tertiary hospital, 49% of participants said their worst pain ratings were in the clinically severe category(9). A study conducted at Gondar Comprehensive specialized hospital revealed the prevalence of postoperative clinically significant pain 40.5% (95% CI: 32.7, 48.4)(16). In summary, this study shows a notable segment of the population continues to endure pain during hospital stays though the results are less compared to other studies.

Severe pain scores were reported in 35.3% of cases following abdominal surgeries, followed by thoracic and genitourinary surgeries at 17.6% each. A study conducted at Grey's Hospital, a South African tertiary hospital, indicated that the most intense pain was reported during needle procedures, such as blood draws, injections, and venous cannulation (34%), followed by surgery (22%)(3)(3). Similarly the research done at Gondar Comprehensive Specialized Hospital shows abdominal surgeries has the highest count for severity of pain 47.3% followed by orthopedics 44% (16). In the Saint Paul pediatric emergency department, severe pain was predominantly associated with malignancies (70%), followed by surgical procedures (35%) (6). Overall, the data suggest that the perception and severity of pain can

vary depending on the medical condition or procedure, and abdominal surgeries often causing significant discomfort for patients (6).

The present report found that the medical charts under evaluation did not all use the same, objective approaches for documenting pain or for assessing discomfort. Only 25% of patients said that their pain was sufficiently controlled, despite the fact that more than half of them told medical personnel about their discomfort verbally. Comparing this proportion to other research, it was noticeably lower, where a higher percentage of patients reported receiving interventions to address their pain. Notably, even when caregivers informed healthcare workers about their child's pain, there were no records indicating appropriate actions taken. These findings highlight deficiencies in pain reporting, assessment, and management practices compared to hospital in Brazil (12).

According to the study, the great majority of individuals got non-narcotic intravenous (IV) drugs, primarily paracetamol, indicating that non-opioid IV analgesics are widely preferred. In comparison to the south African research, a lesser percentage of patients received an IV prescription for opioids(3). The study done in SPHMMC found that many patients received only paracetamol as a single pain relief option, with no use of opioids or combinations of analgesics, despite the presence of severe pain(6). This study has better utilization of opoids compared to study done at SPHMMC. These findings highlight variations in analgesic prescribing practices and the potential underutilization of stronger pain medications or multimodal analgesia approaches (16).

The present study identified younger Children (< 7 years) experience significantly less mild, moderate, and severe Postoperative Pain. Consistent finding were reported from previous studies(15). This could be due to cognitive and emotional development stages of younger children can influence how they interpret and communicate pain and younger children might not fully comprehend or articulate their pain experiences, potentially leading to underreporting of pain severity. Study suggests that while younger children do experience postoperative pain, the severity may not be communicated compared to older children (15).

The current study has important ramifications for clinical practice when it comes to prescribing painkillers as-needed (PRN) vs standing (scheduled) prescriptions. According to

the study, 87.5% of analgesic orders are planned rather than PRN, indicating a substantial dependence on standing dosage regimens for postoperative pain treatment. Standing prescriptions are more successful in maintaining constant pain management. Furthermore, based on the regression analysis, the study report identified, standing dose prescription was linked with lower risk of pain among post-operative children. Many other advance publications also regularly reported on this report. For example, a review found that while scheduled (ATC) analgesic administration increased medication use in children, it did not necessarily improve pain relief but maintained therapeutic pain levels and supported postoperative recovery and indicated that the method helps prevent pain and facilitates routine activities (20). Another research also revealed a consistent conclusion, highlighting the advantages of a multimodal strategy for postoperative pain management, which frequently include the planned administration of several analgesics. Analgesic dosages that are adequate can minimize negative effects while reducing or eliminating pain (21). An essential component of efficient pain treatment is maintaining therapeutic drug levels, which is achieved by scheduled dosage.

The current study report offers supportive data on the effectiveness of opioid drugs in relieving mild, moderate, and severe postoperative pain when compared to non-opioid options. These findings are consistent with those of other earlier studies. The review on the same subject made clear how important opioids are for treating moderate-to-severe postoperative pain. It underlined that even while opioids are useful, the possibility of side effects should be considered before using them (22). Even though there is study reported that non-opioid agents like NSAIDs and acetaminophen are effective in reducing pain and have an opioid-sparing effect. However, for severe pain, opioids remain the most effective option(23),(24).

Strength and Limitation of the study

The strength of the study is its one of the few studies conducted on pediatric patients who underwent surgical procedures. It used standardized pain assessment scoring tools to evaluate the patients. The limitations on the study were it was not multi-center. Due to resource limitation, it did not follow the pain score with fixed hour assessment in the 24 hour period.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

Children were evaluated on presence, severity of pain through age-tailored assessment methods, and assessment of pain management. The results indicate that pain persists among postoperative patients. Nonetheless, there was an absence of consistent documentation of pain scores across all records. Additionally, disparities were observed between prescribed medications and their documentation of administration in medical charts. In terms of factors influencing post-operative pain, Children's likelihood of having mild, moderate, or severe postoperative pain were dramatically reduced for age under 7 years, who received narcotic drugs, and were provided standing (scheduled) antipain medications. The significance of age, drug type, and prescription patterns in the management of postoperative pain in pediatric patients is highlighted by these findings. It is imperative that we acknowledge the significance of this issue and work toward bettering the measurement, reexamination, record keeping, and management of pain.

7.2. Recommendation

Health professionals should give stress on pain assessment, multimodal analgesia, orienting family members on non-pharmacologic pain management methods. Each Hospital should organize persistent pain assessment methods and pain management protocols and give the staff appropriate training. Vital sign sheets should have documentation of pain score along with reassessment after intervention.

Establishing age-specific pain evaluation and treatment methods as a key priority is essential to better managing postoperative pain in pediatric patients. Moreover, childhood pain management should take into account the patient's age, and to reduce the risk of severe pain, a proactive strategy with planned administration is advised. The significance of appropriate pain management and its effect on the course of recovery should be brought to the attention of medical professionals, parents, and caregivers.

Further researches should conduct on regional pain management in postoperative period, severity of postoperative pain, and follow up reassessment after interventions.

8. REFERENCES

1. McGrath PA. An assessment of children's pain: a review of behavioral, physiological and direct scaling techniques. Pain. 1987 Nov;31(2):147–76.

2. Clinical Guidelines (Nursing) : Pain assessment and measurement [Internet]. [cited 2023 May 9]. Available from: https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Pain_assessment_and_measurement/

3. Velazquez Cardona C, Rajah C, Mzoneli YN, Friedrichsdorf SJ, Campbell F, Cairns C, et al. An audit of paediatric pain prevalence, intensity, and treatment at a South African tertiary hospital. Pain Rep. 2019 Dec 6;4(6):e789.

4. Vittinghoff M, Lönnqvist P, Mossetti V, Heschl S, Simic D, Colovic V, et al. Postoperative pain management in children: Guidance from the pain committee of the European Society for Paediatric Anaesthesiology (ESPA Pain Management Ladder Initiative). Pediatr Anesth. 2018 Jun;28(6):493–506.

5. Correia MDL, Duran ECM. Conceptual and operational definitions of the components of the nursing diagnosis Acute Pain (00132). Rev Lat Am Enfermagem. 2017 Dec 21;25:e2973.

6. Weldetsadik A, Bonga B. Assessment of pain management in children in a tertiary pediatric emergency in Ethiopia. ETHIOPIAN JOURNAL OF PEDIATRICS AND CHILD HEALTH. 2019: 14(1):29-42. 2019 Apr 8;14:29–42.

7. Miller's Anesthesia, 2-Volume Set - 9th Edition [Internet]. [cited 2023 May 9]. Available from: https://www.elsevier.com/books/millers-anesthesia-2-volume-set/gropper/978-0-323-59604-6

8. Dana D, Tefera M. Knowledge, attitude, and practice of pain assessment and management in children among pediatric and pediatric surgical residents in Tikur Anbessa Specialized Hospital. Ethiop J Health Dev [Internet]. 2021 Nov 25 [cited 2024 May 11];35(3). Available from: https://www.ajol.info/index.php/ejhd/article/view/222702

9. Cummings EA, Reid GJ, Finley AG, McGrath PJ, Ritchie JA. Prevalence and source of pain in pediatric inpatients. Pain. 1996 Nov;68(1):25–31.

10. Mather L, Mackie J. The incidence of postoperative pain in children. Pain. 1983 Mar;15(3):271–82.

11. Avian A, Messerer B, Wünsch G, Weinberg A, Sandner-Kiesling A, Berghold A. Postoperative pediatric pain prevalence: A retrospective analysis in a university teaching hospital. Int J Nurs Stud. 2016 Jul 1;62.

12. Linhares MBM, Doca FNP, Martinez FE, Carlotti APP, Cassiano RGM, Pfeifer LI, et al. Pediatric pain: prevalence, assessment, and management in a teaching hospital. Braz J Med Biol Res. 2012 Dec;45:1287–94.

13. A paediatric pain assessment and management survey at Rahima Moosa Mother and Child Hospital, Johannesburg, South Africa [Internet]. [cited 2023 May 21]. Available from: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742022001000010

14. Walters MA. Pain assessment in Sub-Saharan Africa. 2009;11(3).

15. Mihretu F, Melese E, Jemal S. ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE SCHOOL OF MEDICINE DEPARTMENT OF ANESTHESIA.

16. Mekonnen ZA, Melesse DY, Kassahun HG, Flatie TD, Workie MM, Chekol WB. Prevalence and Contributing Factors Associated With Postoperative Pain in Pediatric Patients: A Cross-Sectional Follow-up Study. Perioper Care Oper Room Manag. 2021 Jun 1;23:100159.

17. IASP Announces Revised Definition of Pain - International Association for the Study of Pain (IASP) [Internet]. [cited 2023 May 9]. Available from: https://www.iasp-pain.org/publications/iasp-news/iasp-announces-revised-definition-of-pain/

18. Gupta A, Kaur K, Sharma S, Goyal S, Arora S, Murthy RSR. CLINICAL ASPECTS OF ACUTE POST-OPERATIVE PAIN MANAGEMENT & ITS ASSESSMENT. J Adv Pharm Technol Res. 2010;1(2):97–108.

19. Breakthrough Pain - an overview | ScienceDirect Topics [Internet]. [cited 2024 May 12]. Available from: https://www.sciencedirect.com/topics/medicine-and-dentistry/breakthrough-pain

20. Hobson A, Wiffen PJ, Conlon JA. As required versus fixed schedule analgesic administration for postoperative pain in children. Cochrane Database Syst Rev. 2015 Feb 26;2015(2):CD011404.

21. Beck DE, Margolin DA, Babin SF, Russo CT. Benefits of a Multimodal Regimen for Postsurgical Pain Management in Colorectal Surgery. Ochsner J. 2015;15(4):408–12.

22. Garimella V, Cellini C. Postoperative pain control. Clin Colon Rectal Surg. 2013 Sep;26(3):191–6.

23. Carter JA, Black LK, Sharma D, Bhagnani T, Jahr JS. Efficacy of non-opioid analgesics to control postoperative pain: a network meta-analysis. BMC Anesthesiol. 2020 Oct 27;20(1):272.

24. Keane A, Jardine K, Goldenberg D, Pradhan S, Zhu J, Mansour J, et al. Opioid versus non-opioid postoperative pain management in otolaryngology. BMC Anesthesiol. 2023 Aug 25;23(1):291.

ANNEX

Annex 1: Declaration of the principal investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Department and College, in effect at the time of grant is forwarded as the result of this application.

Name of the student: _____

Date. _____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor: _____

Date. _____ Signature _____

APPROVAL OF THE SECOND ADVISOR

Name of the second advisor: _____

Date. _____ Signature _____

Annex 2: Subject information sheet

Addis Ababa University

School of medicine

Hello, my name is ----------, I am here in behalf of Dr. Mahdere Hailemelekot, a student in Addis Ababa University School of medicine. She is conducting a research on "prevalence of postoperative pain in Pediatric patients in Tikur Anbesa Specialized Hospital, Addis Ababa in age group 1-14 years at Tikur Anbesa Specialized

Hospital, Addis Ababa Ethiopia." She has received permission from Addis Ababa University School of medicine and Tikur Anbesa Specialized Hospital officials to conduct the study.
You are selected to participate in this study because you (your child, ward) are currently admitted to the hospital and surgery was done for you. Your participation in this study will only be based on your willingness to participate. You have the right to choose not to take part in this study. If you are willing, you have the right to stop at any time or withdraw without giving any reason which you will not be subjected to any ill-treatment. There will be no direct benefit by participating in this study but in future information gathered by this study will help policy makers, programmers and researchers to give appropriate attention on issues of interest and design specific treatment options.

The information that you provide will be kept confidential by using only code numbers and locking the data. Only the members of the study team will have the access to the non-coded data and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

If you need any further information or explanation regarding to the study, you can have this address to contact.

Name: Dr. Mahdere Hailemelekot Tel- Email- mahihellahaile@gmail.com

If you have questions at any time about this study, you may contact the researcher whose contact information is provided above.

Your participation in this study is voluntary. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw.

Annex 3: Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I consent to take part in the research study of "Assessment and management of acute postoperative pain in pediatrics at Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia"

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

Annex 4: Data collection tool

This questionnaire is derived from standard questionnaires with modifications

1. Demography of the patient

1.	Age in years	1-2		
		3-5		
		6-11		
		12--14		
2.	sex	F		
		M		
3.	Current living area	Urban		
		Rural		
4.	School level	Preschooler		If the respondent is a parent or legal guardian: Proper education: yes ____ No ____
		Kindergarten		
		1-4 grade		
		5-10 grade		
		Not in formal education		
6.	Surgical diagnosis (from medical chart)			

2. Who is responding the following question:

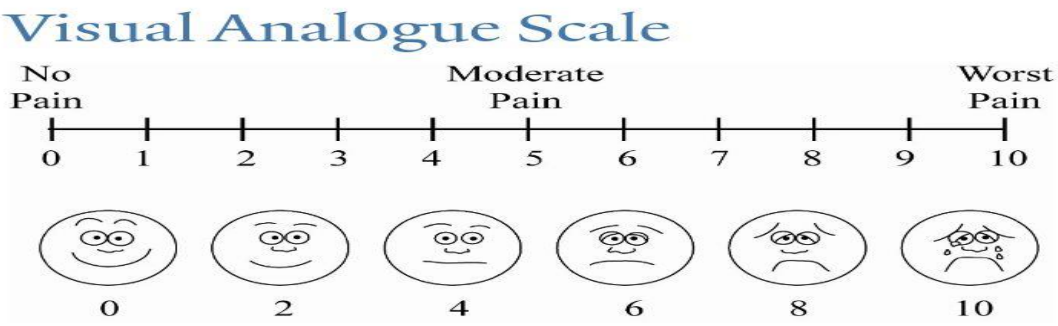
The patient	
The parent or legal guardian	

3. Questions related to current pain

3.1	What type of surgery was done?	ENT		Specify the type of surgery (from the
		Chest		
		Gastrointestinal		

		Genitourinary		medical record)
		Neurology		_____
		Orthopedic		
3.2	Did you (the child) experience pain in the past 24 hour?	Yes		
		No		
3.3	If yes, where was the pain located on the body?	Head and neck		
		Chest		
		abdomen		
		Lower extremity		
		Upper extremity		
		Back		
3.4	Was the pain related to the surgical incision site?	Yes		
		No		
3.5	If no, specify	e.g IV line, IM injection, NGT insertion…		
3.6	How do you rate the pain?	No pain- 0		
		Mild 1-3		
		Moderate 4-6		
		Severe 7-10		

Use VAS score for patients above 5 years old



	0	1	2
ፊት	ምንም አይነት የፊት ለውጥ ወይም ፈገግታ የለም	አልፎ አልፎ ፊት ማጨማደድ፣ፍላጎት ማጣት፣መሸሽ	ቶሎ ቶሎፊት ማጨማደድ ፣ ጥርስ መንከስ
እግር	ዘና ያለ	እረፍት ማጣት፣ መወራጨት	በእርግጫ መምታት ፣እግርን ወደላይ ማምጣት
እንቅስቃሴ	በጸጥታ መተኛት	መገላበጥ	ጉብጥ ማለት፣ ድርቅ ማለት
ማልቀስ	ማልቀስ የለም (በ ንቃት፣በ እንቅልፍ ጊዜ ,)	ማቃሰት፣ አልፎ አልፎ ማጉረምረም፣ ቅሬታ ማቅረብ	አለማቋረጥ ማልቀስ፣ በተደጋጋሚ ቅሬታ ማቅረብ
ማባበል	ዝም ያለ፣ ጸጥያለ፣ፈታያለ	አልፎ አልፎ በማጫወት፣ በማቀፍ፣ በማውራት ማባበል መቻል	ለማባበል የከበደ

FLACC pain score: for under 5 patients

	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin

Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal positon, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaints	Crying steadily ,screams or sobs, frequent complains
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or "talking to distractions"	Difficult to console or comfort

4. If there was pain, was it reported to medial staff? Yes: No:
5. If yes, was the pain managed? Yes: No:
6. Is there standard pain score documentation on the medical charts?

   Yes: No:

   If yes; type of pain assessment tool and frequency of assessment
7. Order for analgesics medication

Were analgesics ordered? (check medical chart)	Yes
	No
	Standing dose
	PRN
Narcotics	
Non-narcotics	
Who is ordering the medications?	Anesthesia provider
	Non anesthesia provider

8. Is there a plan for break through pain management? Yes: No:
9. Was the medication ordered carried out on medication chart?

   Yes: if all are carried out

   No: if one or all not carried out on medication chart
10. Intervention done for the pain

Pharmacological (check medical chart)	Pills or syrups	Narcotics	
		• Non-narcotics Ibuprofen • paracetamol	
	Intravenous	Narcotics • Morphine • Tramadol • fentanyl	
		Non-narcotics Paracetamol	
	Suppository		
Non-pharmacological	Touch		
	Talk		
	Food/Sleep		
	Distraction		
	Repositioning		
	Other		

11. Do family members receive an orientation on different non-pharmacological interventions?

    Yes: No:

12. Reasons for a medication being ordered but was not given

Financial constrain	
Unavailability of medication	
Unavailability of family members	

Are you satisfied with the pain management?

Yes: No:

Post-operative assessment tools

FLACC pain score: for under 5 patients

	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal positon, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaints	Crying steadily ,screams or sobs, frequent complains
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or “talking to distractions”	Difficult to console or comfort

	0	1	2
ፊት	ምንም አይነት የፊት ለውጥ ወይም ፈገግታ የለም	አልፎ አልፎ ፊት ማጨማደድ፣ፍላጎት ማጣት፣መሸሽ	ቶሎ ቶሎፊት ማጨማደድ ፣ ጥርስ መንከስ
እግር	ዘና ያለ	እረፍት ማጣት፣ መወራጨት	በእርግጫ መምታት ፣እግርን ወደላይ ማምጣት
እንቅስቃሴ	በጸጥታ መተኛት	መገላበጥ	ጉብጥ ማለት፣ ድርቅ ማለት
ማልቀስ	ማልቀስ የለም	ማቃሰት፣ አልፎ አልፎ	አለማቋረጥ ማልቀስ፣

	(በ ንቃት፣በ እንቅልፍ ጊዜ ,)	ማጉረምረም፣ ቅሬታ ማቅረብ	በተደጋጋሚ ቅሬታ ማቅረብ
ማባበል	ዝም ያለ፣ ጸጥያለ፣ፈታያለ	አልፎ አልፎ በማጨውት፣ በማቀፍ፣ በማውራት ማባበል መቻል	ለማባበል የከበደ

VAS score for patients above 5 years old