ADDIS ABABA UNIVERSITY SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

INCIDENCE AND ASSOCIATED FACTORS FOR PERIOPERATIVE RESPIRATORY ADVERSE EVENTS IN ELECTIVE PEDIATRIC SURGICAL PATIENTS WITH RECENT UPPER RESPIRATORY TRACT INFECTIONS IN SELECTED PUBLIC HOSPITALS, ADDIS ABABA , 2025: A PROSPECTIVE COHORT STUDY

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A THESIS TO BE SUBMITTED TO THE DEPARTMENT OF ANESTHESIA AT ADIS ABABA UNIVERSITY'S COLLEGE OF HEALTH SCIENCES IN ORDER TO PARTIALLY FULFILL THE REQUIREMENTS FOR THE MASTER OF CLINICAL ANESTHESIA DEGREE..

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SUMMARY

Background: Pediatric surgery patients frequently have perioperative respiratory adverse events (PRAEs), which are responsible for one-third of cardiac arrests and three-quarters of perioperative critical occurrences. Thus, upper respiratory tract infections (URIs) are the most frequent cause of PRAE and are the main reason for postponing surgical intervention in pediatric patient's .Currently, there is no consensus on the best period to postpone surgery in children with recent upper respiratory tract infections.

Objectives: To determine the incidence and risk factors for perioperative respiratory adverse events in elective pediatric surgical patients with recent upper respiratory tract infections at selected public hospitals in Addis Ababa from January 1 to March 30 / 2025.

Methods: Using Systematic random sampling technique, a prospective cohort study of two hundred forty two (242) pediatric surgical patients aged neonate to 16 years old for two days who present with recent upper respiratory tract infections between Jan 1 to March 30 / 2025 were studied. Data were gathered using a structured questionnaire. Therefore, univariate and multivariate binary logistic regression models were used to analyze the data. Variables were deemed statistically significant if their 95% CI was less than 0.05. AOR, median (IQR), mean ± standard deviation (SD), or patient count (%) were used to present the findings.

Results: A total of 81 (33.5%) pediatric surgical patients with recent URTI experienced perioperative respiratory adverse events. Additionally, the postoperative phase was the critical phase for PRAES to occur, with desaturation and laryngospasm being the most common adverse events observed. Logistic regression analyses demonstrated that age (AOR:3.67,CI:1.5-9,p:0.004), airway related surgery, duration of procedure, obesity, ETT use, a symptom-free period of less than a week (AOR:4.3,CI:1.2-15.7,p:0.026), and multiple URTI symptoms (AOR:3.8,CI:1.5-9.1,p:0.002) were independent risk factors for respiratory adverse events in pediatrics undergoing general anesthesia ($P<0.05$).

Conclusion and recommendation Age, BMI, Duration of surgery, airway device, operation type, and symptom free period, and multiple URTI symptoms, history of respiratory illness were identified as independent risk factors for respiratory adverse events in pediatric patients undergoing general anesthesia. Therefore, clinicians should conduct comprehensive preoperative evaluation to assess the factors that increase the odd of perioperative respiratory adverse events to optimize, as well as prepare them for less risky surgery.

Key words: Pediatric Anesthesia, Recent upper respiratory tract infection, Risk factors, perioperative respiratory adverse events, Elective surgery, Ethiopia

DECLARATION

I, the undersigned, attest that this thesis is completely unique, has never been presented before at this or any other university, and that all citations to the sources included in this project have been correctly cited.

Name_____ Signature _____Date _____

Primary Advisor

Name_____ Signature _____Date_____

Co-Advisor

Name_____ Signature _____Date _____

TABLE OF CONTENTS

SUMMARY i
DECLARATION ii
TABLE OF CONTENTS iii
LIST OF TABLES iv
LIST OF FIGURES iv
ABBREVIATIONS AND ACRONYMS v
ACKNOWLEDGMENT vi
CHAPTER ONE: INTRODUCTION 1
1.1. Background 1
1.2. Problem statement 3
1.3. Justification of the study 5
CHAPTER TWO: LITERATURE REVIEW 6
2.3. Conceptual frame work 10
CHAPTER THREE: OBJECTIVES 11
3.1. General Objective: 11
3.2. Specific objectives 11
CHAPTER FOUR: METHODS 12
4.1. Study area: 12
4.2. Study design: 12
4.3. Study Period: 12
4.4. Population 12
4.4.1. Source Population 12
4.4.2. Study population 12
4.5. Sample size determination and Sampling techniques 13
4.5. 1.Sample size determination 13
4.5.2. Sampling Procedure 14
4.6. Variables 15
4.6.1. Dependent variable 15
4.6.2. Independent Variables 15
4.7. Eligibility Criteria 15
4.7.1. Inclusion criteria 15
4.7.2. Exclusion criteria 15
4.8. Data collection procedures/ methods/ 16
4.9. Data quality management 16
4.10. Operational definitions 17

4.11. Data Analyzing and processing 18
4.12. Ethical consideration 18
4.13. Dissemination Plan 18
CHAPTER FIVE: RESULTS 19
CHAPTER SIX: DISCUSSION 24
CHAPTER SEVEN: CONCLUSIONS 27
CHAPTER EIGHT: STRENGTH AND LIMITATION 27
CHAPTER NINE: REFERENCES 28
CHAPTER TEN: ANNEXES /APPENDIX 33
9.1. Questionnaire and Informed consent 33

LIST OF TABLES

TABLE 1: Severity rating of perioperative respiratory adverse events in Pediatric surgical patients with recent URTI undergoing surgery under general anesthesia. 17
TABLE 2: Clinical characteristics of pediatric patients with recent URTI who had procedures under general anesthesia at the study area during the study period (n = 242). 19
TABLE 3: The intensity of perioperative respiratory adverse events in pediatric patients with recent URTIs who underwent surgery under general anesthesia at the study area during the study period (n = 242). 20
TABLE 4: Occurrences of respiratory adverse events at each phases of the perioperative period at the study area during the study period (n = 142). 21
TABLE 5: Pearson Chi-squared and Fisher-exact tests for variables attributed to perioperative respiratory adverse events within pediatric patients underwent surgery under general anesthesia at the study area during the study period (n = 242) ..... **Error! Bookmark not defined.**
TABLE 6: Bivariate and multivariate binary logistic regression analysis for determinants of PRAEs in pediatric patients who underwent surgery under general anesthesia at the study area during the study period (n = 242). 23
Table 7: Demographic information at selected public hospitals who had surgery following a URTI in 2025. 33
Table 8: Clinical and Perioperative characteristics of Pediatric surgical patients with recent URTI who underwent surgery at selected public hospitals in Addis Ababa, 2025 34

LIST OF FIGURES

Figure 1: Conceptual framework adopted from literatures on determinants for perioperative respiratory adverse events (1,3,21,40,41) 10
Figure 2: Schematic Presentation of Proportional Allocation and Sampling Procedure 14
Figure 3: A Stacked histogram of Severity of PRAEs with its frequency 20
Figure 4: line graph of phase of anesthesia to observed PRAES (N=142) 21

ABBREVIATIONS AND ACRONYMS

PRAEs	*Perioperative respiratory adverse events*
TASH	Tikur Anbesa Specialized hospital
URTI	Upper Respiratory Tract Infections
SFP	Symptoms Free Period
WHO	World Health Organization
ETT	Endortracheal Tube
LMA	Laryngeal Mask Airway
FOB	Fiberoptic Bronchoscope
COPD	Chronic Obstructive Pulmonary Disease
ASA	American Society of Anesthesiologists
ENT	Ear,Nose,Throat
DL	Direct Laryngoscopy
UAO	Upper Airway Obstruction
SFP	Symptoms Free Period
Hgb	Hemoglobin
Intraop	Intraoperative
Postop	Postoperative
ZMH	Zewuditu Memorial Hospital
MIIRH	Menilik The Second referral Hospital

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CHAPTER ONE: INTRODUCTION

1.1. Background

Respiratory adverse events defined as any episode of oxygen desaturation, partial or total airway obstruction, continuous coughing, breath holding, or bronchospasm. (1). The leading cause of substantial morbidity and death as well as extended hospital stays during the perioperative period is respiratory adverse events, which also contribute significantly to the risks associated with surgery and anesthesia, even with advancements in pediatric anesthesia(2). In pediatric anesthesia, respiratory adverse events account for one-third of all perioperative cardiac arrests and three-quarters of serious sequela ;however, It can be difficult to identify children who are at high risk before surgery(1–3).

Due to recurrent respiratory tract infections (URTIs) and anatomical and physiological factors, children are susceptible to respiratory adverse events such as laryngospasm, bronchospasm, and prolonged hypoxemia that are the conditions that might cause potentially fatal complications and mortality (4,5).

Nevertheless, the type of surgery, coexisting disease, early identification, and timely corrective action all affect how severe PRAEs and associated sequels are which ranges from temporary harm with complete recovery to unexpected morbidity and fatality (6,7).

Similarly, adverse occurrences during surgery were significantly correlated with the patient's age, anesthetic induction procedures, coexisting disease, and airway related procedures. The incidence of respiratory adverse events varies depending on the airway device, the urgency of the procedures, and plane of anesthesia while extubating(8–10).

According to reports, children with URTIs have two to seven times' greater incidence of perioperative respiratory adverse events (PRAEs) than children without. If the trachea is intubated, the incidence rises to eleven times higher. While bacterial complications like acute sinusitis, acute otitis media, and lower respiratory tract infections are more common in certain patients, the majority of URTIs is caused by viruses and go away on their own its symptoms are a sore throat, runny nose, nasal congestion, sneezing, dry cough, mild fever, and a mild malaise (11).

Changes in pulmonary function, such as reduced diffusion capacity, decreased lung compliance, increased airway resistance, abnormalities in lung clearance mechanisms because of lower respiratory tract involvement, and airway hyper reactivity to stimuli, which can last for up to six weeks following a URTI, could be the cause of this discrepancy. It is hypothesized that oropharyngeal receptor sensitization brought on by pharyngeal epithelial injury during a URTI may reflexively facilitate airway hyper reactivity(12).

The use of endotracheal tube, age under 5 years old, history of premature birth (<37 weeks), history of reactive airway disease, parental smoking, airway-related surgery, presence of massive secretions, and nasal congestion are reported as independent risk factors for PRAEs in pediatrics with recent URTIs. RAEs were linked to a 7–13 days without experiencing symptoms and unusual chest imaging ,according to a study by Lee et al (10).If these risk factors are present, the choice to continue administering anesthetic for a child with a URTI must be made. It must also be considered in conjunction with requirement for emergent surgical intervention and the anesthesiologist's experience .Therefore, children's with complex URTI require elective surgery delayed for more than four weeks, according to one review report, but children with uncomplicated URTI should only have elective surgery postponed for up to two weeks. Regarding the best time to postpone surgery in those children , there is no agreement (13).

1.2. Problem statement

In patients with hyperreactive airways, pediatric anesthetic care is linked to perioperative laryngospasm, bronchospasm, breath holding, and hypoxia. (14). About 15–50 percent of children receiving general anesthesia experience PRAE(15). According to a prospective Cohort study, there were no changes in the occurrences of laryngospasm and bronchospasm between children who had an active URTI, a recent URTI (within 4 weeks), and no symptoms at all (16). On the other hand, compared to children without it , children with active and recent URTIs experienced a higher incidence of overall unfavorable respiratory events, major desaturation (oxygen saturation < 90%) events, and breath holding episodes which is congruent with von Ungern-Sternberg et al.'s largest observational study to date, reported that, children with current and recent URTI (<2 weeks) had higher PRAE (25 and 29%, respectively) than children without URTI or with URTI between 2 and 4 weeks (12% and 8%, respectively) in 9297 children presenting for elective surgery (17). Different studies also reported varying degree of PRAE in pediatric patients with URITs., such as breath holding, arterial oxygen desaturation (<90%), laryngospasm, and bronchospasm(15,18,19).

Adverse respiratory events were more common in children with URIs, although none of them were linked to any long-term negative consequences and use of an endotracheal tube, less than five years old, history of prematurity, reactive airway disease, maternal smoking, airway surgery, copious secretions, and nasal congestion were determinants for adverse respiratory outcomes(16) .Another study by Lee et al. (2020) revealed that, of all risk factors, unusual chest imaging and emergency surgery were significant risk factors in patients with upper respiratory infections(10). Another prospective observational study which underwent in northwest Ethiopia revealed that 26 % of pediatric patients (both emergency and elective) experienced PRAEs that were strongly correlated with age < 1 year, ASA > 3, upper respiratory tract infections (URTIs), upper airway secretions, and operations related to the airways, and desaturation were the most frequent incidents seen mostly after surgery (8).

However, since children typically get a lot of URTIs episodes each year, there isn't much time to arrange elective procedures when the child doesn't have a active or recent infection (less than four weeks earlier)(20). Recently, there are an increasing number of people with surgery scheduled who sporadically appear with it and this poses them to disastrous PRAE. So, the contributory factors should be identified in order to prevent or lessen the associated squel.

Hypothetically, patients who recently experienced URTI should have procedures done after they have been free of its symptoms for a minimum of one to two weeks amid normal chest image findings, optimized emergency surgical procedures, can greatly lower the frequency of perioperative respiratory adverse events.

The incidence and determinant factors for PRAE, which is common in pediatric patients with recent URTI, have not yet been studied in Ethiopia, Moreover, previous studies abroad did not appear to evaluate the associated factors within these high-risk patients, and the urgency of surgery was not taken into consideration, despite the fact that it greatly influences the incidence of PRAEs. As a result, researching this topic with a larger population size and other risk factors may significantly save medical expenses, shorten hospital stays, and reduce critical perioperative respiratory events that might be fatal. Therefore, the investigation intends to assess the determinant factors for the occurrence of these respiratory adverse events among pediatric patients with recent URTIs. In addition, it aims to identify the safest time to perform surgery on pediatric patients who have experienced recent upper respiratory infections (URTIs) as this brought no consensus within anesthesiologists/anesthetists. In conclusion, the findings of this study are expected to significantly improve patient safety, enhance anesthesia practices, and reduce unnecessary healthcare costs.

1.3. Justification of the study

PRAES are more common in pediatric patients who have recently had URTIs. These incidents can have a wide range of consequences, from mild adverse events like blockage of the airway, bronchospasm to sever complications such as pneumonia or respiratory failure that potentially leads to death. Consequently, this study will be carried out in order to determine the best time to delay and defer these individuals to minimize perioperative respiratory adverse events and determine any risk factors that, in addition to URTI, may exacerbate unfavorable respiratory outcomes. Therefore, the findings of this investigation will benefit:

Patient/community: Improving patient outcomes and safety by allocating resources wisely and enhancing quality.

Healthcare professionals: helps to enhance evidence-based decision making for better perioperative patient care, as conventional anesthetic management techniques have been causing unintended perioperative consequences.

Healthcare facilities and professional associations. this research will also assist the Ethiopian Society of Anesthetists and the Anesthesia Department in conducting nationwide research on this subject are and in creating guidelines and protocols for the proper management of these patients, from preoperative evaluation through the postoperative phase.

Researchers: Since this topic hasn't been studied in our nation before, this study will help experts in the field get a head start on future research projects.

CHAPTER TWO: LITERATURE REVIEW

2.1. Incidences of PRAEs

According to a single-centered retrospective study by Lee et al. (2020), out of the 267 children who had surgery, 23 (8.6%) experienced PRAEs and children who had symptoms of an upper respiratory infection at the time of surgery had a greater prevalence of PRAEs (14.8%) compared to children without(7.9%) (10). Another study by Tait et al. indicated that children with a current and/or recent URTI experience between 24 -30 percent PRAE as opposed to children without URTI (8 to 17 percent PRAE) which was even more pronounced in infants and those born prematurely though frequencies of laryngospasm and bronchospasm did not differ between children with recent URITs, and asymptomatic children.(16) On the other hand, compared to children without URIs, children with active and recent URIs experienced a substantially higher frequency of breath holding episodes, major desaturation (oxygen saturation less than 90%) occurrences, and overall unfavorable respiratory events(16). Additionally, Tait et al. (2008) studied the relationship between PRAEs incidence and obese children, showed that compared to children who were not obese, these patients had a noticeably increased prevalence of conditions such as type II diabetes, sleep apnea, asthma, and hypertension. Therefore, obese children were more likely than children of normal weight to experience difficult mask breathing, airway obstruction, severe oxygen desaturation (>10% of baseline), and overall critical respiratory adverse events. Additionally, obese children who present for elective surgical procedures have higher rates of perioperative adverse respiratory events and prior concomitant medical problems(21).

According to Mamie et al. prospective cohort study, the incidence of respiratory adverse events after surgery was 21%, while the incidence in the post anesthesia care unit was 13%. Compared to other procedures, children under anesthesia for ENT surgery had a 1.57-fold increased incidence of PRAE. Odds ratio (OR) of PRAE for non-ENT surgical procedures was 1.43, but it rose to 2.74-fold for ENT surgery(22). When tracheal intubation with relaxants was used as part of the anesthetic approach, the incidence of PRAE was considerably reduced and dropped by 8% for every year of age. In addition, the child's age and the anesthetic care they receive seem to have a greater influence on this incidence than the child's medical history(22).

Similar retrospective study by Kim et al. (2013) which reviewed children who had undergone eye and ENT procedures, found that children with a history of passive smoking and an active URI treated with Endotracheal tube and inhalational anesthetics were much more likely to develop PRAE (1). Consequently, the rate of PRAEs is higher in infants in contrast to older children because of their unique anatomical features ,a relatively bigger tongue, obligate nasal breathers smaller airway, and highly compliant chest wall infants are known to be more susceptible to airway obstruction as this contributes to relatively low trans-pulmonary pressures during end expiration and an increased tendency for small peripheral airways to close during tidal breathing (23,24). A different prospective study conducted in Korea in 2013 found that children's with active URIs had a 28.3% PRAEs, about twice as high as the finding by Lee et al.(1,10) . This aligns with a prospective observational research conducted in North West Ethiopia in 2020 by Wudineh et al., found that 26% of PRAEs occurred, with 69% of those events appeared during the postoperative phase(8).

2.2. Risk factors PRAEs

A study by Lee et al .identified age, duration without URI symptoms(7–13 day) , and underlying respiratory disorders, abnormal finding on chest image that suggested pneumonia or bronchiolitis, as linked to unfavorable respiratory outcomes(10). In line with the above study ,recent URIs, the use of an endotracheal tube ,< 5 years olda history of prematurity, a history of reactive airway disease, maternal smoking, airway surgery, oral secretions, and nasal stiffness were contributory factors for adverse respiratory events but ,none of them were linked to any long-term negative consequence (16) .Congruent to the above study, a history of obstructive sleep apnea, obesity, age under 10, and procedures involving the airway were among the risk variables for adverse outcomes ,and compared to children of normal weight, obese children presenting for elective surgical operations have higher rates of perioperative adverse pulmonary events and previous concomitant medical problems (21).

According to a different prospective study, immunological indicators of allergic sensitization showed poor predictive capabilities, but risk variables derived from the children or family medical history revealed to be effective predictors of unfavorable respiratory outcomes as a result, determining which pediatrics are most likely to have a pulmonary adverse event before surgery, clinical evaluation should be used instead of immunological testing (25).

A major retrospective cohort study by A Monsour, N Barrowman, et al, (2020) revealed that Prediction modeling concurrently analyzing comorbidities and polysomnography measurements indicated heart illness, airway abnormality, and young age as independent predictors of PRAEs.

As these results imply that, in a medically complicated population, age and medical comorbidity have a greater predictive power for PRAEs than polysomnography measurements (26). Hence, the pathophysiology of URTI is Damage to the mucosa and epithelium which could sensitize pharyngeal receptors, resulting in airway hypersensitivity and reactivity that can last for 6-8 weeks (16,27,28). Therefore, even if children have two to six episodes of URI annually, anesthesia in patients with hyperreactive airways is associated with PRAEs. If anesthesia is postponed for four to six weeks following each episode, patients may only be asymptomatic for a brief amount of time. (29–31) .

Similar studies revealed that, Patients younger than five years old and especially those in their infancy years with URTI has been identified as a risk factor for perioperative PRAEs(16,32,33). For this reason, the risk declines year by year after 1 year of age(22). However, it has also been noted that parental smoking or active URTI symptoms (such as nasal congestion and copious secretions) are independent predictors of PRAEs (1,16) which is congruent to a study in north west Ethiopia by Wudineh et al.(2022) revealed that PRAEs were significantly linked with age < 1 year ASA $\geq$ 3,URTIs, upper airway secretions ,and airway related surgery(8).

Therefore, unless the procedure is urgent, surgeons postpone procedures in patients with active URTI symptoms, such as rhinorrhea, itchy throat, sneezing, nasal congestion, malaise, cough, or fever >38°C. This lowers the incidence of PRAEs in these patients by performing surgery after at least 1-2 weeks of not having URI symptoms and confirming that the chest image is normal. (10).

Lee et al investigation reported that oxygen desaturation (<90%) were observed repeatedly, affecting 11 patients. Laryngospasm occurred in eight participants, while atelectasis occurred in one, chest retraction in two, pneumonia in two, and excessive respiratory secretion in four among 267 total samples studied(10).Another study revealed that intra operative respiratory events were found in 315 of the 14,153 children in a sizable retrospective cohort. Out of 315 PRAEs, the percentages of desaturation, wheezing or bronchospasm, laryngospasm, reintubation, and upper airway obstruction were, respectively, 235 (54%), 101 (23%), 75 (17%), 21 (5%) and 4 (1%) of cases. Induction period (61.3) had a greater incidence density per 100,000 person-minutes of intraoperative respiratory event than maintenance period (13.7) and emergence period (16.5) ($p < 0.001$) which was congruent to Lee et al findings(10,34).

The first 15, 20, and 30 minutes of anesthesia carried the highest risk of desaturation, wheezing, and laryngospasm, respectively additionally, ASA classification, age, history of respiratory disease, and desflurane versus sevoflurane anesthesia ($p < 0.001$), as well as assisted ventilation via facemask or laryngeal mask compared to controlled ventilation via endotracheal tube ,were anesthesia-related risk factors for laryngospasm(34).

After controlling for age and sex, ASA physical status and weight children who received intravenous propofol had a considerably lower risk of experiencing perioperative respiratory adverse events than those who received inhalational sevoflurane (PRAEs; 39/149 [26%] vs. 64/149 [43%], respiratory adverse events at induction: 16/149 [11%] vs. 47/149 [32%] (35,36). Wudineh et al found out that the most common adverse event, desaturation, was noted 47.3% of the time(8).

According to various studies, children who have had a recent URI have increased likelihood of PRAE, and declines after two weeks and much more after four weeks (17,18,37). It has been indicated that patients with complicated URI wait at least two weeks, but preferably more than four weeks, before having surgery (18,33,38). Berry et al, however, stated that for children's with simple URI, a two-week wait might be adequate (18,39). As a result, the incidence and potential contributors for PRAEs such as age, history of passive smoking, obesity, and underlying respiratory illnesses, symptom free period and URTI symptoms will be investigated since this presents a conundrum for anesthesiologists: should they continue with surgery right away, or should they postpone them for two, three, four, or six weeks?

2.3. Conceptual frame work

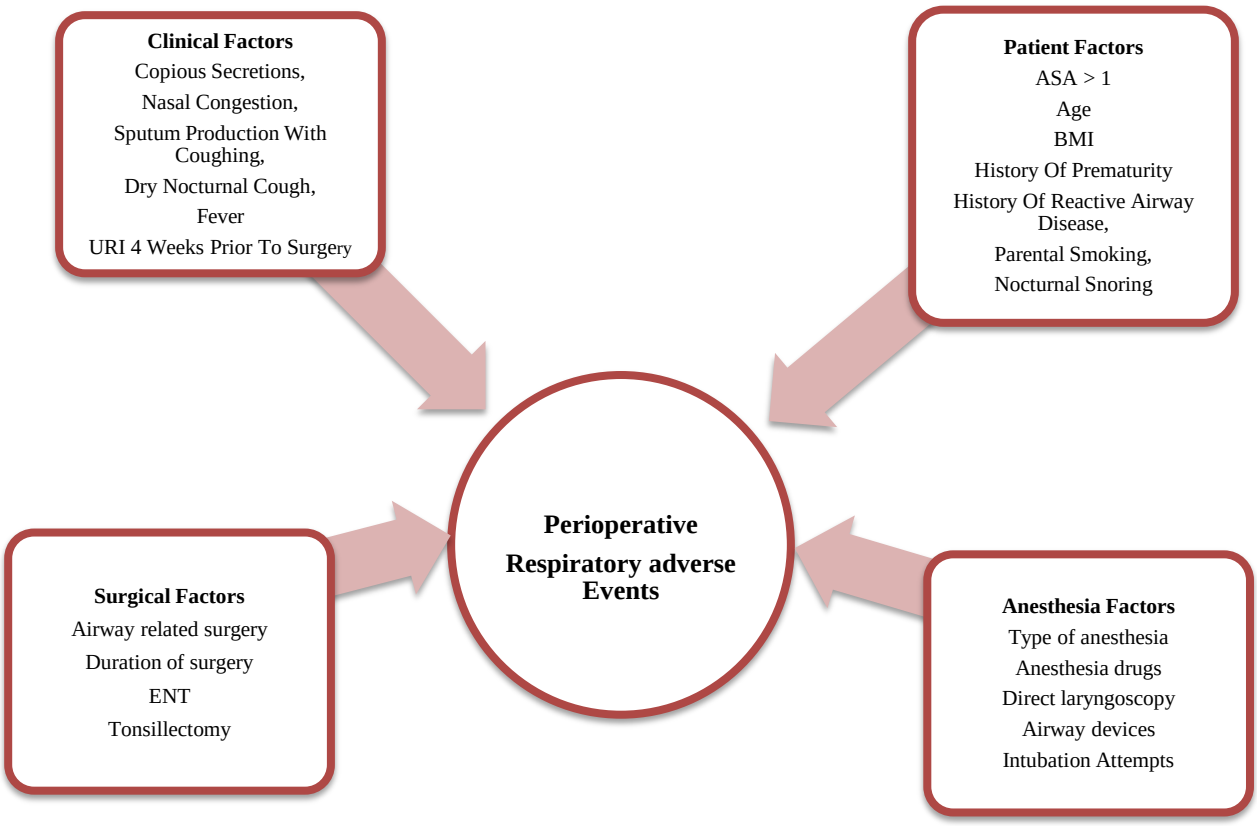

Figure 1: Conceptual framework adopted from literatures on determinants for perioperative respiratory adverse events (1,3,21,40,41)

CHAPTER THREE: OBJECTIVES

3.1. General Objective:

- To determine incidence and risk factors for perioperative respiratory adverse events within elective pediatrics surgical patients with recent upper respiratory tract infection at selected Public hospitals in Addis Ababa from Jan 1-March 30 /2025.

3.2. Specific objectives

- To determine the incidence of perioperative respiratory adverse events in elective pediatrics surgical patients with recent URTI.
- To identify associated factors for perioperative respiratory adverse events in elective pediatrics surgical patients with recent URTI.

CHAPTER FOUR: METHODS

4.1. Study area:

Addis Ababa is the capital city of Ethiopia and had 14 Public hospitals and 40 private hospitals in 2025. The study was conducted at Tikur Anbesa Specialized Hospital, Minilik II Referral Hospital, and Zewuditu Memorial Hospital, which offer medical services not only to Addis Ababa residents but also as referral centers for the country. Addis Ababa is estimated to have 6.6 million residents as of 2017.These hospitals provide comprehensive specialty and subspecialty care, with TASH performing over 1200 pediatric surgical cases annually, followed by the other two hospitals, which conduct hundreds of pediatric surgeries each year.

4.2. Study design: A prospective Cohort study was carried out over the course of two days to determine the factors that contributed to the perioperative respiratory adverse events across pediatric surgery patients who had recently had a URTI.

4.3. Study Period: This investigation was carried out at three Addis Ababa public hospitals between January 1 and March 30, 2025.

4.4. Population

4.4.1. **Source Population**

All pediatric patients with recent URTI who had surgery under elective basis.

4.4.**2. Study population**

All pediatrics surgical patients with recent URTI who operated under general anesthesia, during study period and who met the inclusion criteria.

4.5. Sample size determination and Sampling techniques

4.5. 1.Sample size determination

Appling single population proportion equations

Z= z-score

Proportion=50%

Margin of error (d) = 5%

Confidence interval=95%

Sample size (n)= (z a/2)2x p(1-p/d2

$= (1.96)^2$ x0.5 (1-0.5)/ $(0.05)^2 = 384$

Since the surgical log books showed that only 900, 500, and 500 pediatric surgical procedures were performed annually at TASH, MII RH, and ZMH, respectively, we used a correction formula to determine the sample size.

Using reduction formula; **nf=ni/1+(ni-1/N)**

=384/1+(383/512) =220 and, 10% non-response rates was 22.

=220+ 22

= 242

We found a total of **242** pediatric surgical patients as a final sample size that was selected under Systematic random sampling technique.

4.5.2. Sampling Procedure

- ✓ The study participants' were selected using a systematic random sampling technique.
- ✓ The sampling interval calculated, and K equal to **two.**
- ✓ The sample proportionally allocated for each hospital.

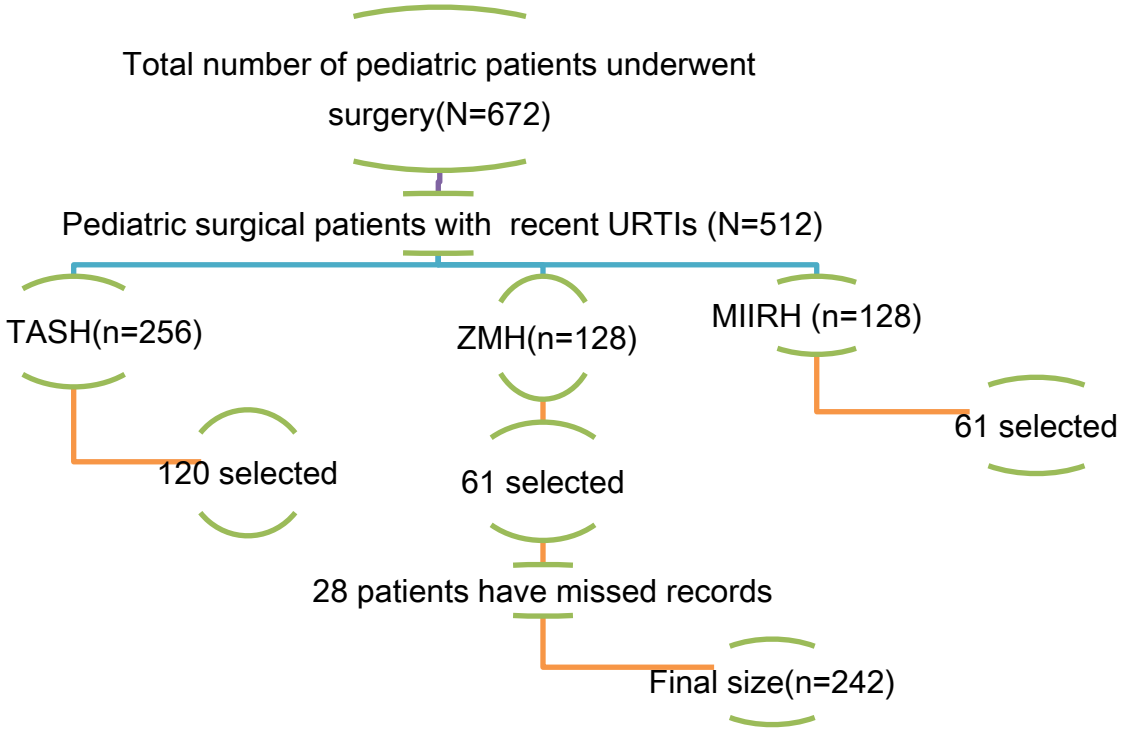

Figure 2: Schematic Presentation of Proportional Allocation and Sampling Procedure

4.6. Variables

4.6.1. Dependent variable

- **Perioperative respiratory adverse events:** this includes desaturation, coughing breath holding, laryngospasm, or bronchospasm occurring perioperative period(2).

4.6.2. Independent Variables

- **Socio-demographic factors**: Age, sex, BMI,
- **Clinical characteristics:** ASA, URTI symptoms, Hemoglobin level, History of prematurity, underlying respiratory disease and URI symptom-free period
- **Anesthesia related factors;** drugs, airway device, depth of anesthesia during extubation
- **Surgery factors:** type, site, duration, Blood loss,

4.7. Eligibility Criteria

4.7.1. Inclusion criteria

- Pediatric elective surgical patients with UTRI who had surgery under general anesthesia from Jan 1 to March 30 / 2025.

4.7.2. Exclusion criteria

- Patients who have missed medical records
- Pediatric patients who are with incapacitating comorbid conditions.
- Pediatrics who have already been intubated because of hypoxia or impending respiratory failure.

4.8. Data collection procedures/ methods/

A structured questionnaire was used to gather information from all eligible pediatric surgery patients. All risk factors for PAREs were collected from medical charts, preoperative anesthesia evaluation sheets, Intraoperative anesthesia record sheets, referral papers. With the use of a standardized questionnaire instrument, the child charts were examined for age, preoperative URTI symptoms, surgical operation type, history of recent URTIs, prematurity, chronic respiratory illness, diagnosis, vital signs, outcome, and other pertinent information. The questionnaires are generated and adjusted based on the research review articles and World Health Organization (WHO) statistics. The questioners were filled by two anesthetists. Finally, data were entered into a computerized database using appropriate software and thoroughly cleaned to ensure accuracy and completeness, including checking for errors, inconsistencies, and records with > 10% missing variables were excluded for variables with less than 5 % missing data mean or mode imputation was used.

4.9. Data quality management

The questionnaire was prepared in English language. A pilot study was conducted on 5% of the calculated sample size (n=12) at Yekatit 12 Hospital Medical College to assess the clarity, consistency and feasibility of the questionnaire. Due to data not being included in the primary analysis, the results were utilized to make small adjustments to the questionnaire. In the interim, supervisors and data collectors received training and orientation regarding the goals and significance of the study on each item, as well as the entire data gathering process. Regular monitoring and follow-up were done while the data was being collected. Every day, supervisors reviewed each questionnaire, and the primary investigator double-checked the results to ensure the data was accurate and consistent.

4.10. Operational definitions

Perioperative respiratory adverse event: are defined as occurrences of desaturation, coughing breath holding, laryngospasm, or bronchospasm.(2)

Active/Recent URTIs: Active URTIs are defined as those that exhibit symptoms during or during the first two weeks of the perioperative period. The URTIs will be regarded as recent URTIs if they happened two to four weeks prior to surgery but were resolved at that time. (42).

Desaturation or hypoxemia: when a pulse oximetry measurement of peripheral arterial oxyhemoglobin saturation (SpO2) < 95% for longer than 30 seconds, independent of 100% oxygen or SpO2 < 90% in ambient air(6).

Multiple intubation attempts: is defined as attempting intubation at least three times. (20).

Active or current URTIs: a parent's affirmation that at least two URTI symptoms—rhinorrhea, sneezing, nasal congestion, painful or scratchy throat, cough, malaise, or fever > 38◦C—were present at the time of operation.(42).

Laryngospasm: partial or complete airway blockage accompanied with stiffness in the muscles of the chest and abdomen that necessitates the use of succinylcholine or positive pressure ventilation (22).

Bronchospasm: the need for bronchodilators or an increase in respiratory effort, particularly on expiration and wheezing on auscultation (42).

Breath holding or apnea: When the patient experienced breathing irregularities or apnea lasting longer than 15 seconds, or if bradycardia or cyanosis are linked to the apnea. (22) .

TABLE 1: Severity rating of perioperative respiratory adverse events in Pediatric surgical patients with recent URTI undergoing surgery under general anesthesia.

Parameter	Mild	Moderate	Sever
Bronchospasm	Exhalation phase only	Exhalation and inhalation phase	Ventilation is difficult; treatment is required.
Laryngospasm	incomplete obstruction requires repositioning only	incomplete obstruction requires CPAP	Total airway obstruction needs muscle relaxant
Coughing	1-2 sec	3-5	Continuous
Breath Holding	<15 sec	15-30 sec	>30 sec
Oxygen Desaturation	90-94	85-90	<85

4.11. Data Analyzing and processing

The Shapiro-Wilk normality test was employed to confirm the normality, and a p value > 0.05 was considered indicative of normal distribution. Bivariate binary logistic regression were used to ascertain the relationships between the variables and chi-square test were used if expected frequency in each cell is > 5 or fisher's exact tests when violated and statistical significance was $p < 0.2$, the strength of association was described using crude odd ratio, model fitness was evaluated using the Hosmer-Lemeshow test amid multicollinearity was diagnosed using tolerance and variance inflation factors. whereas multivariate binary logistic regression were employed with 95% CI cut-point for statistical significance was $p < 0.05$ and association were executed with adjusted odds ratio. The data was analyzed using SPSS version 26.

4.12. Ethical consideration

The Institutional Review Board (IRB) of Addis Ababa University's College of Health Science granted ethical clearance, which was then submitted to the Addis Ababa City Public Health Research and Emergency Management Directorate. Upon approval, they provided a letter of support to be distributed to hospitals, as It was inquired. and an official letter of collaboration was delivered to the hospitals, followed by the case team or relevant departments. As a result, surveys were protected, patient privacy was preserved, and patient identities were not revealed.

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4.13. Dissemination Plan

Copies of the final findings will be sent to the College of Health Sciences' anesthesia department of Addis Ababa University. First and foremost, the study's results will be presented at the yearly conferences of the Association of Ethiopian Anesthetists and distributed to hospitals which were studied. Lastly, a concerted attempt will be made to publish the study's results in an internationally recognized journal.

CHAPTER FIVE: RESULTS

This study included two hundred forty two (242) elective pediatric surgical patients with URTIs who were given general anesthesia. Twenty eight patients' incomplete data were eliminated, and 93.8% of people responded. Males made up 163 (66.3%) of the patients. The median age of patients were two years (IQR: 0.5-7 years). Of the total patients, 230 (95%) were ASA class I and II, while the remaining 12(5%) were categorized as ASA III and above. The surgery took an average of 112 ± 79.5 minutes (See table 2).

TABLE 2: Clinical characteristics of pediatric patients with recent URTI who had procedures under general anesthesia at the study area during the study period (n = 242).

VARIABLES		PRAES N (%)		
		No	**Yes**	Total n(%)
Age	>=1	110(83.3)	27(17.7)	137(56.6)
	<=1	51(48.6)	54(51.4)	105(43.4)
Prematurity	No	152(66.1)	78(33.9)	230(95)
	Yes	9(75)	3(25)	12(5)
Hemoglobin	< 11 g/dl	40(65.6)	21(34.4)	61(25.2)
	≥ 11 g/dl	121(66.9)	60(33.1)	181(74.8)
Procedure	Non Airway	122(68.5)	56(31.5)	178(73.5)
	Airway	39(60.9)	25(39.1)	64(26.5)
Airway device	ETT	100(58.5)	71(41.5)	171(70.6)
	Others	61(85.9)	10(14.1)	71(29.4)
Induction	Combined	14(73.5)	5(26.5)	19(7.9)
	Inhalation	34(51.5)	32(48.5)	66(27.3)
	Intravenous	113(72)	44(28)	157(64.8)
Extubation	Awake	125(63.5)	72(36.5)	197(81.4)
	Deep	36(80)	9(20)	45(19.6)
Blood loss	<10%	121(72)	47(28)	168(69.4)
	10-20%	4(50)	4(50)	8(3.3)
	>20%	36(54.5)	30(45.5)	66(27.3)
Transfusion	No	139(72.8)	52(27.2)	191(78.9)
	Yes	22(43.1)	29(56.9)	51(21.1)
Symptom Free Period	1–6	16(33.3)	32(66.7)	48(19.8)
	7–13	80(67.2)	39(32.8)	119(49.2)
	14-28	4(80)	1(20)	5(2.1)
	>28	61(87.1)	9(12.9)	70(28.9)
Obesity	No	153(73.9)	54(26.1)	207(85.5)
	Yes	8(22.9)	27(77.1)	35(24.5)
RMI	No	134(72.8)	50(27.2)	184(76)
	Yes	27(42.6)	31(57.4)	58(24)

Of 242 pediatric surgical patients, 81 (33.5%) experienced PRAEs (95% CI: 27.5–39.5%). Although there were 142 PRAE episodes, the most common adverse event was desaturation, which happened 57 (40.1%) times, followed by laryngospasm 39 (27.5%), coughing 23 (14.2%), breath holding 16 (11.2%), and bronchospasm 7(4.9%). Out of the 142 PRAE episodes, the majority 60 (42.2%) occurred postoperatively, 53 (37.3%)during induction, and 29 (20.5%)were observed intraoperative .Furthermore, on severity of PRAE, 4 patients (1.7%) had severe oxygen desaturation, 1(0.4%) severe breath holding, 7(2.9%) persistent coughing, and 8 (3.3%) severe laryngospasm (SpO2 < 85%). and 10 (4.1%) developed laryngospasm, which was completely managed using basic airway techniques and positive ventilation(See table 3,4).

TABLE 3: The intensity of perioperative respiratory adverse events in pediatric patients with recent URTIs who underwent surgery under general anesthesia at the study area during the study period (n = 242).

	Not seen	Mild	Moderate	Sever	Total Seen n (%)
Bronchospasm	237(97.9)	1(0.4)	1(0.4)	3(1.2)	5(2.1)
Laryngospasm	220(90.9)	4(1.7)	10(4.1)	8(3.3)	22(9.1)
Coughing	229(94.6)	2(0.8)	4(1.7)	7(2.9)	13(5.4)
Breath holding	232(95.9)	5(2.1)	4(1.7)	1(0.4)	10(4.1)
Desaturation	212(87.6)	13(5.4)	14(5.8)	4(1.7)	31(12.4)
Total		25	23	23	81(33.5)

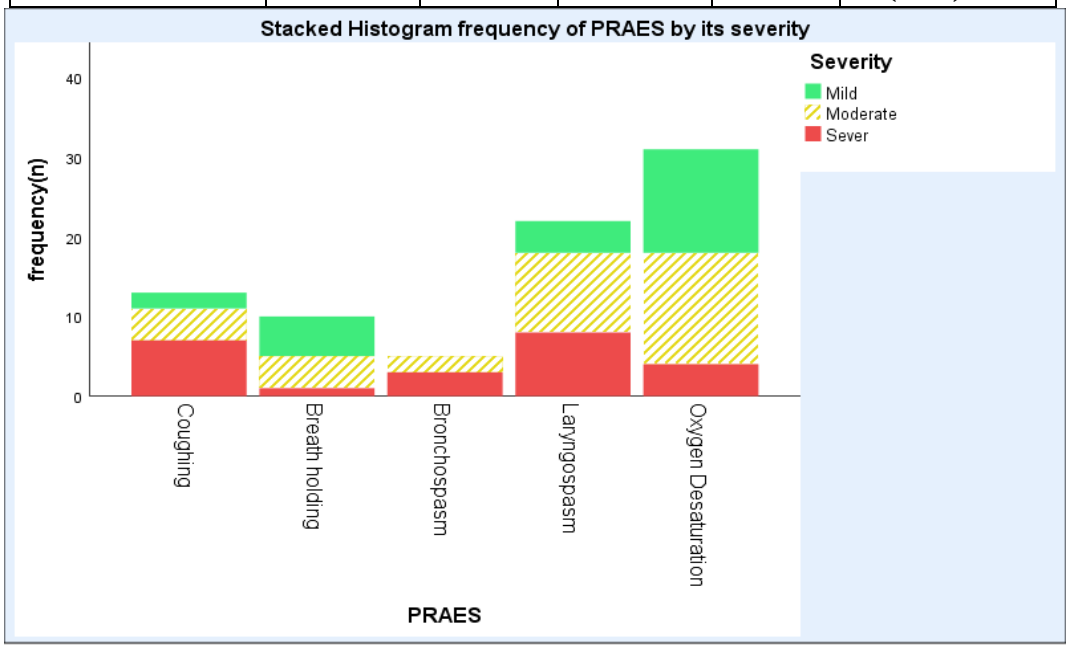

Figure 3: A Stacked histogram of Severity of PRAEs with its frequency

TABLE 4: Occurrences of respiratory adverse events at each phases of the perioperative period at the study area during the study period (n = 142).

		Bronchospam	Laryngospam	Coughing	Breath holding	Oxygen Desaturation	Total: n(%)
Phase of occurrence	Induction	5	27	8	2	11	53(37.3)
	Intraoperative	1	1	10	1	16	29(20.5)
	Postoperative	1	11	5	13	30	60(42.2)
	Total: n(%)	7(4.9)	39(27.5)	23(14.2)	16(11.2)	57(40.1)	142(100)

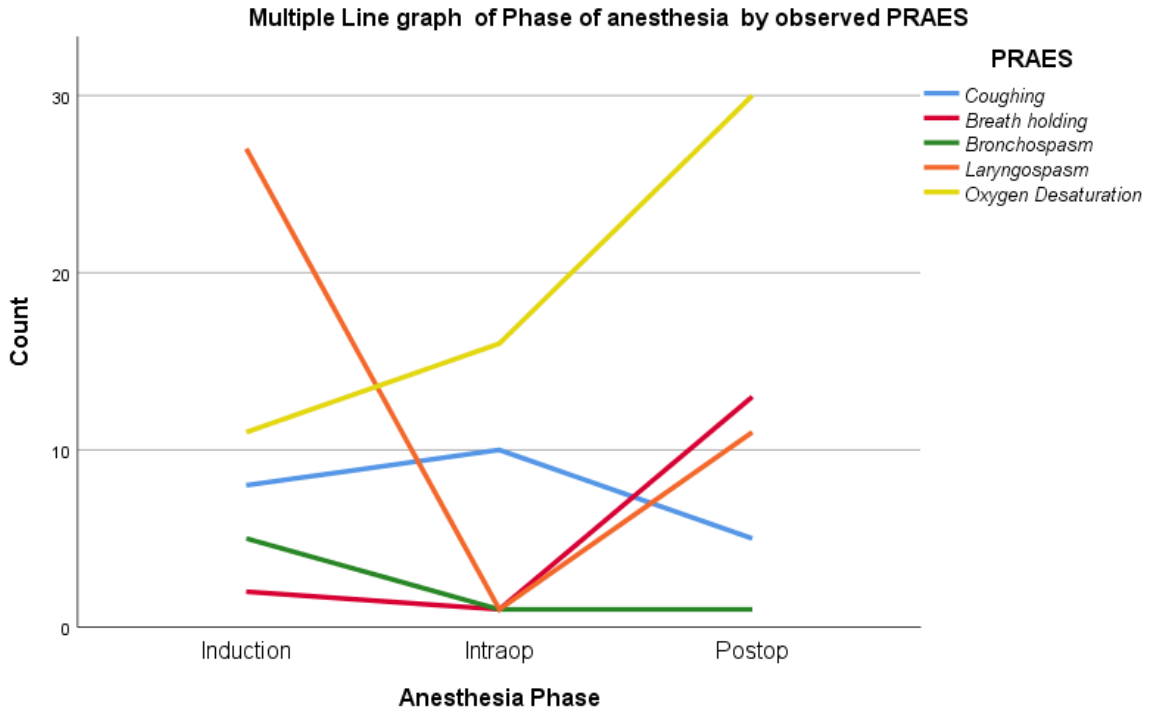

Figure 4: line graph of phase of anesthesia to observed PRAES (N=142)

Bivariate binary logistic regression study revealed that PRAEs were associated to comorbidities, a symptom-free period of 1–14 days, repeated tracheal intubation attempts (≥ 3 trials), multiple URTI symptoms, obesity, light anesthesia, and operation length > 120 minutes. Nevertheless, the last multivariate binary logistic regression analysis showed that infants, a symptom-free interval of 1-6 days, multiple URTI symptoms, obesity, several intubation attempts, and Surgery involving the airways was all substantially linked to PRAEs.. Furthermore, the likelihood of getting PRAES was 4.6 times higher for those who used an ETT tube as an airway management approach (AOR:4.6, CI (1.6-13.4), p:0.005). The choice of induction drugs, plane of anesthesia during extubation, ASA physical state, and prematurity, however, were all statistically insignificant.

Remarkably, infants had multiple attempts at tracheal intubation than their counter parts (54.3% vs. 45.7%, p: 0.001). Pediatric surgical patients with multiple URTI symptoms were 3.8 times greater likelihood of experiencing PRAEs (AOR; 3.8, CI:1.6-9.1, P:0.002). Compared to their counterparts, patients who had airway-related procedures had a higher incidence of PRAEs. (AOR: 2.6, CI: 1.–6.9, p: 0.048). The incidence of PRAEs was also observed to be correlated with obesity (AOR: 4.4, CI: 1.1–17.1, p: 0.031). Moreover, PRAEs were more than four times high likely to occur in pediatric surgery patients with a symptom-free interval of one to six days than in those with a duration longer than a week (AOR: 4.3, CI:1.2-15.7, p:0.026). Moreover, Infants were 3.7 times more likely than older children to experience PRAEs (AOR: 3.67, CI: 1.5–9.1, p: 0.004). PRAEs are likely to occur after a surgical procedure lasting more than 120 minutes (AOR:4.3, CI:1.8-10.4, p:0.001) **(see table 6).**

According to this study, PRAEs had no correlation with prematurity, plane of Anesthesia during extubation, ASA physical status, choice induction anesthetic agents, a week or longer without experiencing any URTI symptoms.

TABLE 5: Bivariate and multivariate binary logistic regression analysis for determinants of PRAEs in pediatric patients who underwent surgery under general anesthesia at the study area during the study period (n = 242).

Variables		PRAEs n(%)		Odd ratio(95% CI)		P- value
		No	Yes	Crude	Adjusted	
Age	<=1	51(48.6)	54(51.4)	4.3 (2.4-7.6)	3.67(1.5-9)	0.004
	>1	110(80.3)	27(19.7)	1	1	
ASA	>=3	4(33.3)	8(66.7)	4.3(1.3-14.7)	0.45 (0.1-1.6)	0.211
	<=2	157(68.3()	73(31.7)	1	1	
URTI Symptom	Multiple	64(52.5)	58(47.5)	3.9 (2.2-7)	3.8(1.6-9.1)	0.002
	Single	98(81.4)	22(18.6)	1	1	
Obesity	Yes	8(22.9)	27(77.1)	9.6(4.1-22.3)	4.4(1.1-17.1)	0.031
	No	153(73.9)	54(26.1)	1	1	
Respiratory Medical Illness	Yes	27(11.2)	31(12.8)	3.0(1.7-5.7)	2.5(1.9-6.8)	0.027
	No	134(55.4)	50(20.7)	1		
Symptom Free Period	1-6	16(33.3)	32(66.7)	13.6(5.4 -34.1)	4.3(1.2-15.7)	0.026
	7-14	80(67.2)	39(32.8)	3.3(1.5 – 7.3)	1.9(0.7-5.6)	0.230
	14-28	4(80)	1(20)	1	1	
	>29	61(87.1)	9(12.9)	1	1	
Intubation Attempts	Multiple	125(73.1)	46(26.9)	14.2(7.3-27.8)	12.9(5-33.5)	< 0.001
	Single	36(50.7)	35(49.3)	1	1	
Airway Device	ETT	61(85.9)	10(14.1)	4.3(2.1-9.0)	4.6(1.6-13.4)	0.005
	Non ETT	100(58.5)	71(41.5)	1	1	
Procedure	ENT	122(68.5)	56(31.5)	1.4(0.8-2.5)	2.6(1.0-6.9)	0.048
	Non ENT	39(60.9)	25(39.1)		1	
Duration	> 2 Hour	52(53.6)	45(46.4)	2.6(1.5-4.5)	4.3(1.8-10.4)	0.001
	< 2 Hour	109(75.2)	36(24.8)	1	1	
Depth of Anesthesia	Light	125(63.5)	72(36.5)	2.3(1.1-5.1)	2.7(0.8-9.0)	0.114
	Deep	36(80)	9(20)	1	1	
Induction technique	Inhalational	14(73.7)	5(26.3)	2.42(1.3-1.4)	2.3(0.5-10.4)	0.294
	Intravenous	34(51.5)	32(48.5)	1	1	
	Combined	113(72)	44(28)	1	1	

CHAPTER SIX: DISCUSSION

In children with recent URTIs who had surgery at the study sites, the total rate of PRAEs was a significant 81 (33.5%)Consistent with this study, Kim et al. revealed that 25% of patients with active URTIs had RAE and the risk is higher particularly when the URTI was within 2 weeks (1,3). Nevertheless, our findings contradicted a research by Hyo Sung Kim et al. that found 21.6% (3). Likewise, von Ungern-Sternberg et al. demonstrated that 21% of pediatric surgery patients had PRAEs (25). The inclusion of a bigger sample size and the a minimum number of patients with a higher risk of acquiring PRAEs might account for the disparities. Moreover, a retrospective multicenter research involving 14,153 patients, only 2.1% of patients had PRAEs (34). It could be explained by variations in PRAE definitions as any episode of sever airway obstruction that managed with positive pressure ventilation, bronchodilators , retrospective study design and settings, and larger sample sizes with both URTI and not.

The incidence of PRAEs in our study was higher than that of a previous study by Wudineh et al. in northwest Ethiopia, which found that it was 26%.(8).The discrepancies could be that our study accompanied larger sample and only included Patients who had recently URTI and. Furthermore, in contrast to the current study, several earlier studies confirmed a reduced prevalence of PRAEs (8%,11%,11.4%,21 %)(2,16,21,22,43).

Our study's higher incidence may have resulted from the incorporation of patients with recent URTIs who are most at risk for PRAES, a larger sample size, inaccurate information provided by patient attendants during preoperative evaluation, incorrect URTIs diagnosis, the inclusion of obese patients, and the recovery of pediatric patients in a recovery unit which lacked pediatric specialists and is poorly equipped. However, a recent study of 476 indicated that 55.25 % patients had PRAEs(7). The inclusion of patients at high risk for PRAEs, a larger sample size, and a different definition of PRAE as oxygen saturation of less than 95% at rest could explain this.

In our study, thirty-one (12.4%) patients experienced oxygen desaturation, the most prevalent PRAE. Taken together, occurrences of it was in line with a multicenter study findings (8) . Similarly, it was more prevalent postoperatively than during the intraoperative phase, which contradicted a previous retrospective study that found the majority of PRAEs happened during the induction phase(34). Whereas, laryngospasm were seen among 22 (9.1%) patients which was consistent with an observational study which claimed 5.7%(8). It was 4% in the general pediatric population, in particular (2). Extubation was the most frequent time of occurrence. As in earlier research, laryngospasm was more frequently linked to the presence of URTIs and airway secretions(17).Additionally, the events were correlated to the patient's and family's history of respiratory conditions, including asthma, allergic rhinitis, pneumonia, and common cold, because these conditions caused the airways to become hyperactive, stimulated excessive secretions, and caused morphological damage to the respiratory tract's mucosa and epithelium. (44).Twenty-two (9.1%) patients and thirteen (5.4%) experienced complete airway obstruction and persistent coughing, respectively. The incidence of laryngospasm was 0.63% in a prior research (19).This disparity could result from their exclusion of infants less than three months old and only taking into account those who were managed with ETT, despite the fact that this was consistent with our findings as well as our study covered a high number of infants, 105 (43.4%). Because the tidal volume in younger children is equal to the closing volume, the terminal bronchioles close more readily, leading to desaturation and apnea (44).

Compared to children, infants were more susceptible to developing PRAEs(16).Desaturation occurs more frequently in infants (8,45). Due to their undeveloped respiratory centers, infants are more susceptible to PRAEs such hypoxia because of their increased oxygen demand and lower oxygen reserves. Breath holding was also common in this patient group. Furthermore, we have shown that children’s were more likely than older patients to have repeated tracheal intubation attempts. (AOR: 12.9, CI:(5.0-33.5) ,P:<0.001). Consequently, multiple intubation attempts were linked to PRAEs(1).

In this study, the duration of the symptom-free interval was a key factor in determining PRAE occurrence. In line with pediatric patients who postponed for two weeks or more, who were symptom-free for a week only experienced four times as many respiratory adverse events as those who did not (AOR:4.3,CI:(1.2-15.7),p: 0.026) (10).Consistent with several earlier investigations, this study demonstrated that adverse events, primarily respiratory in nature were associated to obese pediatric surgery patients(AOR 4.4, CI: 1.1-17.1, P:0.031) (11,21).

Our study demonstrated that airway related procedures elevated the likelihood of getting PRAEs by three fold since these procedures linked to upper airway blockage and frequent desaturation. Prior multicenter prospective investigations corroborated the findings. (8,12,13,46).Pediatrics that requires airways surgery frequently has bronchial hypersensitivity and persistent airway inflammation, which may lead to PRAEs. Laryngeal reflex response may result from surgical instruments and airway manipulation(2). Furthermore, PRAEs, particularly desaturation and airway obstruction, were associated to pediatrics who presented with multiple URTI symptoms including fever, wheezing, and copious secretions since ,airway soiling that necessitates regular suctioning may aggravate airway hyper-reactivity (AOR: 3.8, CI :(((1.6-9.1), p: 0.002))(16).

CHAPTER SEVEN: CONCLUSIONS

Perioperative respiratory adverse events were the most frequent clinical incidents with in pediatric patients presented with recent URTIs, Out of these, desaturation was the most common and postoperative phase was the most crucial for PRAE to occur. As a result, Infants under one year old, those who have had recent URTIs, obese, airway surgery, surgical duration of > 2 hours, URTI symptoms free for less than a week, and multiple URTI symptoms, repeated intubation attempts with ETT, and self or family history of respiratory illness were independent determinants for PRAEs.

In light of this, Pediatric surgical patients with URTIs should be scheduled at least one week after they have stopped experiencing symptoms. In some instances Nonetheless, noninvasive airway devices could be used during procedures to reduce the risk.. Additionally, depending on the severity and volume of symptoms they are experiencing, this period may be prolonged for two or even four weeks. Therefore, in order to manage perioperative respiratory adverse events, Health care providers should conduct comprehensive preoperative assessment to optimize, and prepare them for less risky surgery. Further, multicenter, comparative, and larger sample size investigations should be conducted by researchers in the field..

CHAPTER EIGHT: STRENGTH AND LIMITATION

Since this prospective, multicenter study was the first of its kind in our country, and we believe it could serve as a basis for large scale researches in the area, particularly in environments with resources limited settings. This study only included pediatric surgical patients who had recent URTI; emergency and non-URTI patients were excluded. The other drawback is that, although we chose patients who exhibited at least one of the symptoms of clear or green nasal secretion, dry or moist cough, nasal congestion, or fever (≥ 38oC) as reported in earlier research (17,42), and these symptoms are not unique to URI. As a result, the outcomes might be different for the patients without. Additionally, there were no X- ray images for most patients to confirm it.

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CHAPTER TEN: ANNEXES /APPENDIX

9.1. Questionnaire and Informed consent

Addis Ababa University, College of Health science, department of Anesthesia data collection tools

To determine Incidence and Risk Factors for Perioperative Respiratory Adverse Events in Pediatrics with Recent Upper Respiratory Tract Infection in Tikur Anbesa Specialized Hospital,Minilik II Referral Hospital And Zewuditu Memorial Hospital, 2025.

I go by _____. I am a member of the data collection team in the department of anesthesia at Addis Ababa University. Information on contributing factors to perioperative respiratory adverse events in pediatric surgery patients who have recently experienced an upper respiratory tract infection is the aim of this questionnaire. No patient's name or precise address will be disclosed, and all information collected will be kept private. Patients can leave at any moment as long as they are not interested.

Name of principal Investigator: **Bekalu Tefera Negesse**

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Phone number: +251913433450

Advisors:

1. Misrak Yohannes (Assistant professor)
2. Ashenafi Seifu (Assistant professor)

Name of sponsor: Addis Ababa University Medical Registration No: _____

Table 6: Demographic information at selected public hospitals who had surgery following a URTI in 2025.

1. Age of Child	**a) _____**
2. Gender	a) Male b) Female

Table 7: Clinical and Perioperative characteristics of Pediatric surgical patients with recent URTI who underwent surgery at selected public hospitals in Addis Ababa, 2025

3. Has the child has any recent URTI?	a) Yes b) No	
4. What are the current symptoms?	a) Cough b) Wheezing c) Shortness of breath d) Fever e) Copious secretions	
5. How long has the child been experiencing symptoms free days?	a) 1–6 b) 7–13 c) 14–28 d) ≥29	
6. Is the child obese?	a) Yes b) No	
7. ASA	a) Class I b) Class II c) Class III	
8. Has the child been diagnosed with any chronic respiratory illness?	a) Yes b) No	If Yes, I. Allergic rhinitis II. Asthma III. Pneumonia
9. How much was hemoglobin level?	a) >11g/dl b) <11g/dl	
10. How was the anesthesia	a) Inhalational	

delivered?	b) IV c) Combined
11. What method was used for airway management?	a) ETT b) LMA c) FOB d) FM
12. What specific anesthetic drugs were used?	a) Induction Agents b) Maintenance Agents c) Analgesics d) Adjuncts
13. What was the specific surgical procedure performed?	a) ENT b) General c) Neurology d) Orthopedics
14. How much blood was lost?	**a)** >10% **b)** 10 -20 % **c)** >20%
15. Were any blood transfusions required?	a) Yes b) No If yes how much unit _____
16. What was the actual surgical duration?	a) _____Minutes
17. How many attempts were made at intubation?	a) Once b) Two c) Multiple
18. How do they Extubated ?	a) Awake b) Deep

19. Did respiratory adverse events noticed?	a) Yes b) No	If Yes, I. Desaturation II. Bronchospasm III. Laryngospasm IV. Breath holding V. Coughing
20. How sever was the respiratory adverse event?	a) Mild b) Moderate c) Sever	

9.2. Information sheet

The purpose of this information sheet is to provide an overview of the research study.

Title: incidence and contributing factors for perioperative respiratory adverse events in elective pediatric surgical patients with recent upper respiratory tract infections in selected government hospitals, addis Ababa 2024/25: (Prospective observational study)

Name of Principal Investigator: Bekalu Tefera (BSc.)

Name of advisors: 1.Misrak Yohannes (Assistant Professor)

2. Ashenafi Seifu (Assistant Professor)

Name of the Organization: Addis Ababa University, College of Medicine and Health Sciences, Department of Anesthesia

Name of the Sponsor: Addis Ababa University

Purpose of the Research Project: to assess the incidence and determinant factors for perioperative respiratory adverse events in elective pediatric surgical patients with recent upper respiratory tract infections in Tikur Anbesa Specialized Hospital,Minilik II Referral Hospital And Zewuditu Memorial Hospital.

Incentive: Participating in this project carries no financial or incentive benefits. The data gathered for this study will be kept private and accessible to the researcher and research assistant alone. The ethical committee of Addis Ababa University College of Health Science will examine and approve this study endeavor.

Confidentiality: No one other than the principal investigator will have access to the information gathered, your name, or any information extracted from your chart. The information will be coded, protected, and unlabeled to identify research participants.

Whom to contact : this research project was received and approved by Ethical Committee of Addis Ababa University CHS, Department of Anesthesia.

If you have any questions, get in touch with any of the following people and feel free to ask them whenever you'd like:

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9.2.Data safety assuring sheet

s.no	Tools checked	Yes	No	Data entry
1.	Are the criteria for inclusion and exclusion properly completed?	yes		

Data Accuracy check sheet

s.no	Tools	Yes	No
	Are all sociodemographic data questions filled out correctly?	yes	
	Are all preoperative evaluation data filled out correctly?	yes	
	Are all perioperative data properly filled out?	yes	

9.3. Assurance of principal investigator

According to the terms and conditions of the Research Publications Office, which go into effect on the date of this agreement, the undersigned undertakes responsibility for the scientific, ethical, and technical conduct of the research project as well as for providing the necessary progress reports. This application results in the grant being forwarded.

Name of the student: _____

Date._____ Signature _____

Approval of the primary advisor

Name: _____

Date._____ Signature _____

Approval of the co-advisor

Name: _____

Date._____ Signature _____