



# Preoperative Upper Respiratory Tract Infections and Pediatricians' Perspective in Terms of Anesthesia

## Preoperatif Üst Solunum Yolu Enfeksiyonları ve Anestezi Açısından Pediatristlerin Bakış Açısı

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### Abstract

**Objective:** The risks associated with the anesthetic management of a child with upper respiratory infection (URTI) may be unforeseen, especially by pediatricians. It was aimed to investigate the opinions, decisions, and attitudes of pediatricians affecting and contributing to the anesthetic management of children with URTI.

**Material and Methods:** A survey regarding pediatricians' opinions, decisions, and attitudes toward the perioperative management of children with URTI, was conducted in a congress. Participants working in centers in which pediatric surgical procedures were performed during the previous month were included.

**Results:** Of 614 participants, 46.7% (n= 287) were men and mean age was 37.9 ± 9.2 (range; 24-68) years. Laryngospasm/bronchospasm (n= 247, 40.2%) were the most frequently reported perioperative complications experienced. We observed that 41.5% (n= 255) of participants cancelled all types of elective surgeries for children with URTI, while 5% (n= 31) approved all of them. The median length of postponement of procedures was 1 (1-2) week. Increased secretions were the most commonly reported perioperative risk factor. Complete blood count was the most used preoperative test for both elective and urgent surgeries. University staff only approved operations involving short-term sedation when they were elective, but they approved all urgent procedures, even during URTI (p= 0.001 for both). Preoperative tests were least employed by university staff.

### Öz

**Giriş:** Üst solunum yolu enfeksiyonu (ÜSYE) olan bir çocukta anestezi yönetimiyle ilgili riskler özellikle de pediatristler tarafından öncesinde öngörülememektedir. Burada amaçlanan, ÜSYE'si olan çocuklarda pediatristlerin anestezi yönetimini ilgilendiren görüş, karar ve tutumlarını incelemektir.

**Gereç ve Yöntemler:** Bir kongrede ÜSYE'si olan çocuklarda pediatristlerin anestezi yönetimiyle ilgili pediatristlerin görüş, karar ve tutumlarını inceleyen bir anket gerçekleştirildi. Son bir ay içerisinde çalıştığı merkezde pediatrik cerrahi işlemler gerçekleştirilen katılımcılar dahil edildi.

**Bulgular:** Altı yüz on dört katılımcının %46.7 (n= 287)'si erkekti, yaş ortalaması 37.9 ± 9.2 (aralık= 24-68) yıldır. Laryngospazm/bronkospazm (n= 247; %40.2) en sık yaşanmış olan perioperatif komplikasyondur. Katılımcıların %41.5 (n= 255)'inin ÜSYE'si olan çocuklarda tüm elektif cerrahileri ertelediğini, %5 (n= 31)'inin tümünü onayladığını tespit ettik. İşlemleri ortalama erteleme süresi 1 (1-2) haftaydı. Artmış sekresyon en sık bildirilen perioperatif risk faktörüydü. Tam kan sayımı hem acil hem de elektif cerrahiler için en sık kullanılan preoperatif testti. Üniversite personeli elektifse, sadece kısa süreli sedasyon uygulanan işlemleri onaylamaktaydı, fakat tüm acil işlemleri ÜSYE sırasında bile onaylamaktaydı (her ikisi için de p= 0.001). Preoperatif testleri en az üniversite personeli kullanılmaktaydı.

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**Conclusion:** Pediatricians' decisions and attitudes vary. University staff exhibited more convenient management strategies as advised in the literature. Consensus guidelines and specialist training concerning the perioperative management of children with URTI are thought to be necessary for pediatricians.

**Keywords:** Bronchospasm, perioperative management, university staff

## Introduction

Recent improvements in anesthetic management are innovative and exciting, although various issues remain to be resolved. The risks associated with the anesthetic management of a child with upper respiratory infections (URTIs) may be unforeseen. URTIs are among the most frequently encountered diseases in the pediatric population. Even an otherwise healthy toddler may experience 6-8 URTI episodes per year (1,2). Although most cases are self-limiting with little risk of complications, the decision whether to proceed with anesthesia in these children is a challenging one. Endotracheal intubation and use of inhalation anesthetics increase the risk of perioperative adverse events (PAE), and the presence of active or recent URTI exacerbates PAE. Approximately one-third of children with URTI experience laryngospasm, bronchospasm, oxygen desaturation, and sustained cough during perioperative periods (3). The incidence of dysphoria and copious sputum also increases significantly in these children (4). These may also result in impairment of neurological development and significant sequelae due to hypoxia (5).

Due to these risks of URTI during anesthesia, elective procedures for these children are generally postponed, at least until they become asymptomatic. This can result in rescheduling and inevitable organizational disruption. Additionally, delay may adversely affect outcomes for critically ill children or those receiving cancer treatment. Although no guideline is currently available, there are numerous studies and scoring systems which need to be validated to guide the perioperative management of pediatric patients with URTI (5-8). In general, the decision to operate is based on consensus between the surgeon and anesthesiologist. Although pediatric consultation is not routinely required, when a new URTI symptom is presented, the case will be consulted with pediatricians (9). Under these circumstances, the pediatrician comes to play a critical role in the management of these children.

The aim of this study was to investigate the opinions, decisions, and attitudes of pediatricians which affect and contribute to the anesthetic management of children with URTI.

## Materials and Methods

A survey regarding opinions, decisions, and attitudes toward the perioperative management of children with URTI was conducted with pediatricians. A questionnaire consisting

**Sonuç:** Pediatriğin karar ve tutumları değişkenlik göstermektedir. Üniversite personeli literatürde önerilenlere daha benzer yönetim stratejileri uygulamaktaydı. Pediatriğin için görüş birliği sağlayan rehberler ve ÜSYE'si olan çocukların perioperatif yönetimiyle ilgili uzman eğitimleri gerektiği düşünülmüştür.

**Anahtar Kelimeler:** Bronkospazm, perioperatif yönetim, üniversite personeli

of 19 questions was applied to pediatricians the attending 61<sup>st</sup> National Pediatric Congress on November 15-10, 2017, in Antalya, Turkey.

The local ethical committee approved the study, permission was obtained from the congress secretariat, and all questionnaires were completed after provision of written informed consent.

The questionnaire enquired into participants' demographic, training, and practice data, the number of pediatric preoperative consultations during the previous month, percentages of patients with URTI among all consulted patients, and subjects' experiences regarding any complications encountered during previous surgeries. Pediatricians' opinions, decisions, and attitudes toward surgery in children with URTI were then recorded.

Participants working in centers in which no pediatric surgical procedures were carried out during the previous month were excluded.

Statistical analyses were performed on SPSS for Windows version 21.0 software (SPSS Inc., Chicago, IL, USA). Normal distribution of variables was evaluated using the Kolmogorov-Smirnov test. Continuous variables were expressed as mean  $\pm$  standard deviation and mean (interquartile range), while discrete variables were expressed as number and percentage. Differences between categorical variables were analyzed using the chi-square test. Significance was set at  $p < 0.05$ .

## Results

Six hundred fourteen out of 800 questionnaires were included in the study (122 pediatricians declined to complete the questionnaire, and 64 were excluded because no pediatric procedures were performed in their centers) (response rate=76.7%). Men constituted 46.7% ( $n = 287$ ) of the participants, and subjects' mean age was  $37.9 \pm 9.2$  (range; 24-68) years. Mean time elapsed since graduation from medical school was  $14.4 \pm 9.3$  years, and mean time since completion of residency was  $10.3 \pm 8.4$  years. Participants were mostly working in public and training and teaching hospitals, and most were pediatric specialists (Table 1). Laryngospasm/bronchospasm ( $n = 247$ , 40.2%) were the most frequently reported perioperative complications reported by pediatricians. These complications were largely observed when the child had been operated concurrently or within the first week of URTI (Table 1).

**Table 1.** The characteristics and experiences of the participants, n (%)

	n (%)
Type of practice	
Public hospital	198 (31.2)
Training and education hospital	184 (30)
University hospital	117 (19.1)
Private clinic	101 (16.4)
Other*	14 (2.3)
Academic degree	
Resident	120 (19.5)
Specialist	431 (70.2)
Assistant professor	35 (5.7)
Associate professor	21 (3.4)
Professor	7 (1.1)
Postoperative complications encountered during surgery in children with preoperative URTI	
No complications	90 (14.7)
Laryngospasm/bronchospasm	247 (40.2)
Pneumonia	103 (16.8)
Mechanical ventilation support requirement	107 (17.4)
Other complications**	19 (3.1)
Interval between surgery and onset of URTI symptoms	
Concurrent with URTI	151 (24.6)
1 week after onset of URTI	159 (25.9)
2 weeks after onset of URTI	17 (2.8)
3 weeks after onset of URTI	7 (1.1)
4 weeks after onset of URTI	18 (2.9)

\* Various types of public clinics, etc.; \*\*: Myocarditis, cardiopulmonary arrest, myositis, elevated transaminases, etc.  
 URTI: Upper respiratory infections.

Participants reported being consulted for a median 10 (0-200) preoperative patients a month. A median 15% (0-100) of these children had URTI symptoms. Among the entire pediatrician group, 41.5% (n= 255) canceled all types of elective surgery in children with URTI, while 5% (n= 31) approved them. Additionally, 13.5% (n= 83) of pediatricians approved only procedures involving short-term sedation, while 11.6% (n= 71) approved only procedures involving regional anesthesia.

The median duration by which pediatricians decided to postpone elective surgical procedures because of patients' URTI symptoms was 1 (1-2) week, sufficient time to allow patients to be clinically well enough for surgery. Twenty-five (4%) participants decided not to cancel operations, and 12 (2%) decided to cancel them more than one month after onset of URTI symptoms.

Presence of increased secretions was the parameter most commonly regarded as a risk factor in the anesthetic management of children with URTI (Table 2). Complete blood count was preferred for both elective and urgent surgeries in the preoperative period. Participants generally decided to administer etiology-specific treatment.

We also compared groups consisting of residents, specialists, and university staff. Analysis showed that university staff only approve surgery involving short-term sedation when it is elective, but tend to approve all urgent procedures, even if children have URTI (p= 0.001 for both) (Table 3). Generally, pre-

**Table 2.** Participants' opinions, decisions, and attitudes n (%)

Parameter(s) regarded as risk factors for anesthetic management of children with URTI		
Increased secretions		540 (87.9)
Presence of reactive airway disease		457 (74.4)
Intraoperative intubation		451 (73.5)
Presence of wheezing		401 (65.3)
Productive cough		362 (59.0)
Age < 5 years		322 (52.4)
Passive smoking		228 (37.1)
The need for laboratory examination before surgery in children with URTI		
	Elective surgery	Urgent surgery
No need for any laboratory tests	253 (41.2)	138 (22.5)
Oxygen saturation	151 (24.6)	225 (36.6)
Hemogram	315 (51.3)	412 (67.1)
C-reactive protein	261 (42.5)	327 (53.3)
Erythrocyte sedimentation rate	76 (12.4)	57 (9.3)
Chest radiograph	199 (32.4)	317 (51.6)
Arterial blood gases	69 (11.2)	84 (13.7)
Respiratory function test (if the patient is capable of cooperating)	28 (4.6)	30 (4.9)
Others*	47 (7.7)	20 (3.3)
Management of children with URTI before surgery		
	Elective surgery	Urgent surgery
Specific treatment depending on the etiology	351 (57.2)	332 (54.1)
Preoperative oxygen, salbutamol, steroid	42 (6.8)	139 (22.6)

URT: Upper respiratory infections.  
 \* Electrocardiogram, consultations, etc.

**Table 3.** Comparison of pediatricians in terms of decisions and attitudes toward surgery in children with URTI

	Residents	Specialists	University staff*	p
<b>Approval decision for surgery in children with URTI</b>				
Elective surgeries Approval of procedures involving short term sedation only	4 (3.3%)	67 (15.5%)	12 (19.0%)	<b>0.001</b>
Urgent surgeries Approval of procedures involving only short-term sedation	35 (29.2%)	85 (19.7%)	8 (12.7%)	<b>0.005</b>
<b>Preoperative investigation decision for surgery in children with URTI</b>				
Elective surgeries No need for any laboratory tests	34 (28.3%)	189 (43.9%)	30 (47.6%)	<b>0.03</b>
Complete blood count	72 (60.0%)	218 (50.6%)	25 (39.7%)	<b>0.008</b>
Chest radiograph	67 (55.8%)	126 (29.2%)	6 (9.5%)	<b>&lt; 0.001</b>
Urgent surgeries No need for any laboratory tests	20 (16.7%)	97 (22.5%)	21 (33.3%)	<b>0.01</b>
Oxygen saturation	67 (55.8%)	138 (32.0%)	20 (31.7%)	<b>&lt; 0.001</b>
Complete blood count	80 (66.7%)	306 (71.0%)	26 (41.3%)	<b>0.01</b>
C-reactive protein	64 (53.3%)	243 (56.4%)	20 (31.7%)	<b>0.04</b>
Chest radiograph	80 (66.7%)	211 (49.0%)	26 (41.3%)	<b>&lt; 0.001</b>
Arterial blood gases	36 (30.0%)	40 (9.3%)	8 (12.7%)	<b>&lt; 0.001</b>
<b>Preoperative management of children with URTI</b>				
Elective surgeries Specific treatment depending on etiology	62 (51.7%)	276 (64.0%)	13 (20.6%)	<b>0.01</b>
Urgent surgeries Specific treatment depending on etiology	67 (55.8%)	252 (58.5%)	13 (20.6%)	<b>&lt; 0.001</b>

\* University staff, assistant professor, associate professor, and professor.  
URTI: Upper respiratory tract infections.

operative tests were least preferred by the university staff for both elective and urgent surgeries. Similarly, specific treatment based on etiology was less employed among university staff compared to the other groups as preoperative management in elective and urgent surgeries. No difference was determined in terms of experience of postoperative complications among these three groups.

The participants were divided into three groups based on length of professional experience  $\leq 10$  years, 10-20 years, and  $> 20$  years. Participants with 10-20 years' experience ( $n= 52$ , 54.7%) were most likely to postpone elective surgeries. No difference was determined in terms of experience of postoperative complications. No differences were also observed between these groups in terms of preoperative management or decisions to approve operations for children with URTI.

## Discussion

This original study evaluated the decisions and attitudes of pediatricians toward perioperative complications in children with URTI. University staff were particularly confident about urgent surgeries, the majority were deciding to approve all urgent procedures even if children have URTI. However, they were more conservative in terms of elective surgeries, for which they approved only operations involving short-term sedation. All pediatricians in this study cited intraoperative intubation as

one of the most frequent risk factors for PAE as the choice of airway management may be crucial. Intravenous anesthesia and non-invasive airway devices can be less hazardous (5). It was previously shown that anesthesiologists also prefer to use regional techniques instead of general anesthesia in patients with URTI symptoms (10).

URTIs consist of a wide range of infections, including common cold, tonsillitis, pharyngitis, otitis media, and sinusitis, which share common symptoms of nasal congestion, rhinorrhea, cough, sneezing, and sore throat (11). Approximately 15% of children scheduled for surgery have active or recent URTI symptoms within the previous two weeks (12). Similarly, the pediatricians in this study reported that a median 15% of children consulted preoperatively had URTI symptoms. Although URTIs are generally self-limited and resolve without complication, inflammation and edema of the upper respiratory tract result in prolongation of symptoms and various challenges (13). The incidence of airway PAE is not only higher during active URTI, but may also increase in the 2 to 4 weeks immediately after the infection (12). A recent history of URTI entails an even higher risk than ASA physical status for PAE in children (5). URTIs are among the leading reasons for cancellations among pediatric patients. Anesthesiologists decided to postpone the elective surgeries of children with URTI in less than half of cases in one study (10). The pediatricians in this study reported canceling

elective surgeries due to URTI symptoms for a median period of one week. A small proportion of participants decided not to cancel surgery, which may reflect lack of experience or lack of awareness of possible complications. A small number decided to postpone for longer than one month until children become completely asymptomatic, which was compatible with suggestions reported in some previous studies (14).

Anesthesia increases the likelihood of respiratory complications, such as laryngospasm, bronchospasm, breath-holding, desaturation, and post-extubation croup for children with URTI (15). In this study, laryngospasm/bronchospasm were the complications most frequently reported by pediatricians. Such complications were reported to be experienced when anesthesia was applied within the first week of URTI symptoms. The prevalence of PAE in children with URTI is 25% (3). Careful evaluation is therefore required to decide whether or not to proceed with anesthesia. In this study, 41.5% of pediatricians decided to cancel, while 5% approved all types of elective surgeries of children with URTI. Similarly, Fisher (9) reported that most pediatricians considered new URTI symptoms to be risk factors for PAE. Some anesthetic modalities particularly increase the risk of complications in children with URTI. Avoiding intubating the trachea is known to reduce the incidence of respiratory complications (15). Some pediatricians in a previous study also regarded volatile agents as risky (9). Similarly, some of the pediatricians in this study approved only procedures involving short-term sedation or procedures involving regional anesthesia.

Although URTIs are usually regarded as benign under most other circumstances, even clear nasal secretion is a very important trigger for PAEs, as also shown by a previous study (3). Similarly, increased secretions were the parameter most commonly reported by our pediatricians as a risk factor in anesthetic management. One recent study evaluated 363 children with congenital heart disease scheduled for elective therapeutic cardiac catheterization (4). Younger age, passive smoking, and presence of rhinorrhea or moist cough were identified as independent risk factors for PAE in these children. Additionally, dry cough and wheezing is associated with an increased risk for bronchospasm, parameters also cited as risk factors by the pediatricians in this study (5). Anesthesiologists are also known that they regarded fever, productive cough, wheezing, rales, and rhonchi as contraindications for elective surgeries (10).

Proper assessment of the risk of PAE before surgery will enable anesthetic management of children with URTI in order to reduce the likelihood of complications. The pediatricians in this study mostly preferred to perform complete blood count, C-reactive protein tests, and chest radiographs before both elective and urgent surgeries. Similarly, Tait et al. (10) reported that anesthesiologists regarded the complete blood count as one of the most important parameters in making decisions regarding cancellation of surgery for patients with URTI. Although URTI

are generally viral in origin, no specific treatment or tests are generally required. A significant proportion of the participants in this study may have decided to discriminate between viral and bacterial etiologies. And they may have decided to administer specific treatment accordingly. Performing any laboratory investigation and providing etiology-specific treatment were less popular among university staff than the other groups as preoperative management strategies in elective and urgent surgeries. This might be explained by this group's preference for simple clinical viral-bacterial discrimination and confident adoption of a more algorithmic approach. Some efforts have been made to relieve the negative effects of URTI on perioperative course. Corticosteroids and other adjunctive treatments produce inconsistent results, unless patients have known respiratory tract disorders (16-18). These modalities were not frequently preferred by the pediatricians in this study.

Although pediatricians play a critical role in the perioperative management of children with URTI, pediatric traineeship or residency education does not include such detailed training, except for learning from veteran residents or senior consultants. In addition, before completing the questionnaire in the present study, the pediatricians attended no clarifying pre-education, workshop, or session. It would also be useful to investigate the effects of such instruction concerning anesthetic management on these attitudes and decisions. Moreover, this study did not investigate the interaction or co-management between the 'decision-makers,' pediatricians, anesthesiologists, and surgeons, which might influence the management strategies.

In conclusion, this study introduces a novel perspective, that of Turkish pediatricians, concerning the perioperative management of children with URTI. The data demonstrate variability among pediatricians in Turkey in terms of decisions and attitudes. University staff exhibited more convenient management strategies as advised in the literature, compatible with previous suggestions, than the other groups. Consensus guidelines and specialized training for pediatricians concerning the perioperative management of children with URTI are thought to be necessary.

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## References

1. Gruber C, Keil T, Kulig M, Roll S, Wahn U, Wahn V, the MAS-90 Study Group. History of respiratory infections in the first 12 yr among children from a birth cohort. *Pediatric Allergy and Immunology* 2008;19:505-12.
2. Van Der Gaag EJ, Droffelaar NV. Upper respiratory tract infections in children: a normal stage or high parental concern? *Open Journal of Pediatrics* 2012;2:244-9.
3. Kim SY, Kim JM, Lee JH, Kang YR, Jeong SH, Koo BN. Perioperative respiratory adverse events in children with active upper respiratory tract infection who received general anesthesia through an orotracheal tube and inhalation agents. *Korean J Anesthesiol* 2013;65:136-41.
4. Zhang S, Ding S, Cai M, et al. Impact of upper respiratory tract infections on perioperative outcomes of children undergoing therapeutic cardiac catheterisation. *Acta Anaesthesiol Scand* 2018;62:915-23.
5. von Ungern-Sternberg BS, Boda K, Chambers NA, Rebmann C, Johnson C, Sly PD, et al. Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study. *Lancet* 2010;376:773-83.
6. Lee LK, Bernardo MKL, Grogan TR, Elashoff DA, Ren WHP. Perioperative respiratory adverse event risk assessment in children with upper respiratory tract infection: validation of the COLDS score. *Paediatr Anaesth* 2018;28:1007-14.
7. Becke K. Anesthesia in children with a cold. *Curr Opin Anaesthesiol* 2012;25:333-9.
8. Ramgolam A, Hall GL, Zhang G, Hegarty M, Von Ungern-Sternberg BS. Prediction of peri-operative adverse respiratory events in children: the role of exhaled nitric oxide. *Anaesthesia* 2015;70:1160-4.
9. Fisher QA. Clear for surgery: current attitudes and practices of pediatricians. *Clin Pediatr (Phila)* 1991;30:35-41.
10. Tait AR, Reynolds PI, Gutstein HB. Factors that influence an anesthesiologist's decision to cancel elective surgery for the child with an upper respiratory tract infection. *J Clin Anesth* 1995;7:491-9.
11. Winther B, Alper CM, Mandel EM, Doyle WJ, Hendley JO. Temporal relationships between colds, upper respiratory viruses detected by polymerase chain reaction, and otitis media in young children followed through a typical cold season. *Pediatrics* 2007;119:1069-75.
12. Mallory MD, Travers C, McCracken CE, Hertzog J, Cravero JP. Upper respiratory infections and airway adverse events in pediatric procedural sedation. *Pediatrics* 2017;140:e20170009.
13. Kvaerner KJ, Nafstad P, Jaakkola JJ. Upper respiratory morbidity in preschool children: a cross-sectional study. *Arch Otolaryngol Head Neck Surg* 2000;126:1201-6.
14. Parnis SJ, Barker DS, Van Der Walt JH. Clinical predictors of anaesthetic complications in children with respiratory tract infections. *Paediatr Anaesth* 2001;11:29-40.
15. Fregene T, Visram A. Should a child with an upper respiratory tract infection have elective surgery? *Br J Hosp Med (Lond)* 2014;75:358.
16. Kamranmanesh M, Gharaei B. Is corticosteroid of no use for pediatric patients with common cold undergoing anesthesia? A randomized, double-blind, clinical trial. *Anesth Pain Med* 2017;7:e45166.
17. Sun R, Wang G, Gao X, Wang S. Flumazenil reduces respiratory complications during anesthesia emergence in children with preoperative upper respiratory tract infections. *Medicine (Baltimore)* 2018;97:e0516.
18. Armoni-Domany K, Gut G, Soferman R, Sivan Y. Pediatric pulmonologists approach to the pre-operative management of the asthmatic child. *J Asthma* 2015;52:391-7.