

Views of anaesthesia technicians in Türkiye on paediatric anaesthesia: a survey study

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ABSTRACT

Aims: The aim of this study is to evaluate the opinions of anesthesia technicians about pediatric anesthesia.

Methods: Our study is a descriptive and cross-sectional study. The universe of our research is made up of people who graduated as Anesthesia Technicians in Türkiye. There are a total of 29 questions in the online questionnaire, 8 of which are sociodemographic. The data were collected between 15.10.2024-01.11.2024 via social media platforms. The collected data were analyzed with IBM SPSS version 20.0 program.

Results: The average age of the participants was 29.36 ± 7.44 , 74% were women, 53% were single, 72% did not have children and 72%. Decently worked between 1 and 10 years. 61% of the participants reported that they did not receive training about pediatric age group patients, only 51.9% considered themselves adequate about the drug doses used in pediatric patient anesthesia, 67.3% did not feel safe when giving anesthesia in non-operating room anesthesia environments, 69.6% experienced stress in pediatric patient anesthesia, 48.8% did not want to work in the pediatric operating room.

Conclusion: As a result of our study, it was determined that anesthesia technicians did not receive training such as NRP (Neonatal Resuscitation Program), CHILYAD (Advanced Life Support Training for Children), EPALS (European Pediatric Advanced Life Support), in-service, and about half of them did not consider themselves adequate about pediatric anesthesia. It has been determined that pediatric patients experience stress and increased anxiety during anesthesia, do not want to work in the pediatric operating room, and do not feel safe in non-operating room anesthesia environments. It is thought that providing training to anesthesia technicians to increase their knowledge about pediatric anesthesia may be beneficial, and stress and increased anxiety levels may be reduced.

Keywords: Pediatric anesthesia, anesthesia technician, stress

INTRODUCTION

Paediatric anaesthesia is a field that covers patients between the ages of 0 and 18, sensitive to the special needs of this age group, where patient safety and comfort are kept at the highest level, different and special equipment are used and knowledge, attention and experience are required.¹ Psychological, physiological, pharmacological and anatomical characteristics of this sensitive age group are different from those of adults. Even children of the same age show different developmental characteristics from each other.

Respiratory system anatomy of the paediatric age group shows significant differences when compared with adults. The neck and trachea are shorter, the jaw is smaller and the

head and tongue are larger compared to adults. The position of larynx is higher and moves downwards with increasing age. Especially the epiglottis of new-borns is longer and more protruding.² Due to all these characteristics and the position of the larynx, straight slides (Miller) are preferred instead of curved slides (Macintosh) in laryngoscopy of new-borns.

Paediatric patients have high oxygen demand and respiratory rate. While the diaphragm and intercostal muscles are weak, type 1 muscle fibres are few and lung compliance is low. Therefore, the risk of hypoxia and apnoea is high in childhood. Problems related to the respiratory tract occur rapidly. It is vitally important to intervene quickly to airway



problems that may occur.³ The heart rate of 0-18 age group is the highest at birth and reaches the level of adults in time. Their blood pressure is low. They have high blood volume per kilogram and their fluid electrolyte balance is sensitive. Their circulatory system works faster and therefore anaesthetic drugs dissolve and metabolize faster. However, since their kidney and liver functions are not fully developed, their capacity of metabolizing drugs is lower. For this reason, drug dose adjustments, fluid electrolyte balance and blood loss management should be carried out more meticulously and carefully. Bone and muscle tissue of paediatric patients are not fully developed. Care should be taken against pressure damage in surgical positions. In addition, more care should be taken during mask ventilation because of the sensitivity of soft tissues.

Paediatric patients have difficulty in maintaining their body temperature because they have less subcutaneous fat layer. Therefore, additional measures should be taken for hypothermia. When all these anatomical and physiological differences are considered, anaesthesia team assumes a critical role to ensure patient safety and comfort in this environment which is naturally riskier and more stressful than adult anaesthesiology.⁴

In the present study, anesthesia technicians who are part of the team in the preparation and control of anesthesia equipment, preparation of drugs and anesthetic agents, monitoring and observation, emergency response during preparation of drugs and equipment, knowledge of pediatric anesthesia, stress caused by taking pediatric patients, their mastery of pediatric patient drugs and materials, operating room conditions, training they received, etc. we have examined the issues about the pediatric patient.

METHODS

The present study is a descriptive and cross-sectional study. This study has been approved by the Ethics Committee of the Faculty of Social and Human Sciences at Yozgat Bozok University with specific attention to the inclusion of vulnerable participants (e.g., children, pregnant women, individuals with disabilities) (Date: 13.09.2024, Decision No: 251964). Additional safeguards were reviewed and approved by the committee. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Population of the study consisted of all anaesthesia technicians in Türkiye. First anaesthesia technician trainings started in vocational health schools in 1984-1985 academic year. The total number of graduates and students has reached 63763 so far. Considering this number ($n=63763$), a sample group of 382 people was predicted with 95% interval confidence and 0.05 margin of error. Survey method was preferred in order to reach all anaesthesia technicians. Participants were reached through social media platforms with the survey form prepared in Google form. A total of 385 individuals filled in the survey forms.

Statistical Analysis

The survey form consists of 29 questions and two parts. The first part consists of 8 questions including age, gender,

marital status, number of children, educational status, years of employment, institution of employment and the region of employment. The second part consists of 21 questions including the views of anaesthesia technicians about paediatric anaesthesia. The data collected were analysed in IBM SPSS version 20.0. Percentage, frequency, Mann-Whitney U and Kruskal-Wallis H test were applied to the data.

RESULTS

A total of 385 individuals were reached in the present study. Mean age was found as 29.36 ± 7.44 years. It was found that 74% of the participants were female, 53% were single, 72% did not have children, 57% had associate degree, 72% had a working experience between 1 and 10 years, 25% were working in a private hospital and 31% were living in Marmara region. Sociodemographic characteristics of the participants are shown in [Table 1](#).

Table 1. Distribution of participants' sociodemographic characteristics

Sociodemographic characteristics		n	%
Gender	Male	100	26
	Female	285	74
Age	20-24 Years	107	28
	25-29 Years	146	38
	30-34 Years	47	12
	35 Years and higher	85	22
Marital status	Married	182	47
	Single	203	53
Number of children	0	279	72
	1	56	15
	2	50	13
Educational status	Vocational health school	10	3
	Associate degree	220	57
	Undergraduate degree	138	36
	Postgraduate degree	17	4
Years of employment	1-10 years	276	72
	11-20 years	78	20
	21-30 years	31	8
Institution of employment	Unemployed	10	2
	State hospital	93	24
	Education and research hospital	93	24
	Private hospital	95	25
	City hospital	46	12
	University hospital	46	12
	Foundation university hospital	2	1
Region of employment	Marmara region	120	31
	Aegean region	42	11
	Mediterranean region	41	11
	Central Anatolia region	116	30
	Black Sea region	34	9
	Eastern Anatolia region	12	3
	South Eastern Anatolia region	20	5

In order to explore critical aspects of paediatric anaesthesia safety and workforce preparedness, two survey questions were selected for in-depth statistical analysis: (1) “Do you consider yourself competent about the drug doses used in emergency situations in paediatric patients?” and (2) “Do you experience stress, increased anxiety when anaesthetising paediatric patients?” These questions were prioritised because they reflect both technical competence and emotional readiness, two key components for delivering safe and effective paediatric anaesthesia.

The responses of the participants to survey questions about paediatric anaesthesia are shown in **Table 2**.

When the responses of participants to the question “Do you consider yourself competent about the drug doses used in emergency situations in paediatric patients?” were examined, it was found that 78% of women, 39% of participants between

Table 2. Responses of the participants to survey questions.

Survey questions		n	%
9. Are paediatric/neonatal surgeries performed in the hospital where you work?	Yes	344	89.4
	No	41	10.6
10. Is there an age and/or body weight restriction for anaesthesia of paediatric patients in your institution? (You can choose more than one option)	No restrictions. There are no age or weight restrictions.	Yes	270 70.1
	Neonatal patients are not anaesthetised.	Yes	47 12.2
	Patients under 3 years of age are not anaesthetised.	Yes	41 10.6
	Patients born prematurely are not anaesthetized	Yes	16 4.2
	Patients under 10 kg are not anaesthetised.	Yes	10 2.6
	Other	1	0.3
11. Is anaesthesia given to paediatric patients outside the operating room in the institution where you work?	Yes	169	43.9
	No	216	56.1
12. Have you received in-service training on paediatric anaesthesia?	Yes	89	23.1
	No	296	76.9
	I haven't.	Yes	235 61
13. Which of the following training(s) have you received for paediatric age group patients? (You can choose more than one option)	Neonatal Resuscitation Programme (NRP)	Yes	122 31.7
	Training on Advanced Life Support in Children (CHILYAD)	Yes	77 20
	European Paediatric Advanced Life Support (EPALS)	Yes	5 1.3
14. Do you consider yourself competent about the drug doses used in emergency situations in paediatric patients?	Yes	133	34.5
	No	107	27.8
	Undecided	145	37.7
15. Do you consider yourself competent about the drug doses used in paediatric patient anaesthesia?	Yes	200	51.9
	No	72	18.7
	Undecided	113	29.4
16. Do you have enough information about consumables in different sizes according to age used in paediatric patients?	Yes	306	79.5
	No	20	5.2
	Undecided	59	15.3
17. How many people monitor the maintenance of anaesthesia in 'PEDIATRIC ANESTHESIS' at the same time in your work environment?	1	149	38.7
	2	186	48.3
	3	42	10.9
	≥4	8	2.1

The table continues

Table 2. Responses of the participants to survey questions (the table continues)

18. As an anaesthesia technician in paediatric anaesthesia in the institution where you work, do you ever have or have you ever had to monitor patients alone?	Yes	333	86.5
	No	52	13.5
19. Do you have a premedication room for only paediatric patients in your work environment?	Yes	89	23.1
	No	296	76.9
20. Is premedication given to paediatric patients in your work environment?	Yes	228	59.2
	No	157	40.8
21. Are paediatric patients able to stay with their families in the premedication room in your work environment?	Yes	186	48.3
	No	199	51.7
22. Where is the pre-operative vascular access performed for paediatric patients?	Operating room	Yes	194 50.4
	Clinic	Yes	134 34.8
	Premedication room	Yes	56 14.5
	Emergency room	Yes	1 0.3
23. Which anaesthesia method is most preferred for paediatric patients in your work environment? (You can choose more than one option).	Sedation	Yes	384 99.7
	General anaesthesia	Yes	335 87
	Local anaesthesia	Yes	52 13.7
	General+aegional anaesthesia	Yes	38 9.9
	Regional anaesthesia	Yes	10 2.6
24. Write down the name of the most common paediatric surgeries in your work environment	Circumcision	Yes	229 59.5
	Inguinal Hernia	Yes	117 30.4
	Tonsillectomy	Yes	90 23.4
	Adenoidectomy	Yes	78 20.3
	Undescended testicle	Yes	67 17.4
	Appendectomy	Yes	64 16.6
	Hypospadias	Yes	49 12.7
	Fracture	Yes	27 7
	Shunt	Yes	21 5.5
	Tooth	Yes	18 4.7
	Vascular access	Yes	285 74
25. What are the most common operational problems you experience during paediatric surgeries? (You can select more than one option).	Material preparation	Yes	34 8.8
	Fluid management	Yes	22 5.7
	Other	Yes	19 4.9
	Intubation	Yes	13 3.4
	Ventilation with a mask	Yes	12 3.1
26. Would you feel safe giving anaesthesia to paediatric patients in non-operating room settings (MRI, angio, urodynamic, etc.)?	Yes	46	11.9
	No	259	67.3
	Undecided	80	20.8
27. Do you experience stress, increased anxiety when anaesthetising paediatric patients?	Yes	268	69.6
	No	68	17.7
	Undecided	49	12.7
28. Would you like to work in paediatric operating room?	Yes	118	30.6
	No	188	48.8
	Undecided	79	20.6
29. Reasons for not wanting to work in paediatrics operating room (Grouped)	Stressful working environment	Yes	58 15.1
	Considering oneself inadequate	Yes	33 8.6
	High risk	Yes	31 8.1
	Other	Yes	38 4.7
	Difficult working conditions	Yes	16 4.2
	Monitoring patients alone/ insufficient number of staff	Yes	12 3.1

the ages of 25 and 29, 59% of participants who had associate degree, 74% of participants who had worked for 1-10 years and 29% of participants working in training and research hospital had responded as “no”. Statistically significant difference was found when compared with the other groups ($p < 0.05$). The distribution of the responses given by participants to the question about emergency drugs are shown in [Table 3](#).

When the participants' responses to the question “Do you experience stress, increased anxiety when anaesthetising

paediatric patients?” were examined, it was found that 71% of women, 36% of participants between 25 and 29 years of age, 58% of participants with an associate degree, 71% of participants who had been employed for 1-10 years and 26% of participants working in a state hospital responded as “yes”. Statistically, no significant difference was found compared to other groups ($p > 0.05$). Distribution of participants' responses to the question related with stress and increased anxiety is shown in [Table 4](#).

Table 3. Competence of participants on drug doses used in emergency situations in paediatric patients

Sociodemographic characteristics			Yes	No	Undecided	p**
Gender	Male	n/%*	48 (36%)	24 (22%)	28 (19%)	0.004
	Female	n/%*	85 (64%)	83 (78%)	117 (81%)	
Age	20-24 years	n/%*	17 (13%)	31 (29%)	59 (41%)	0.000
	25-29 years	n/%*	50 (38%)	42 (39%)	54 (37%)	
	30-34 years	n/%*	20 (15%)	12 (11%)	15 (10%)	
	35 years and higher	n/%*	46 (35%)	22 (21%)	17 (12%)	
Educational status	Vocational health school	n/%*	5 (4%)	1 (1%)	4 (3%)	0.001
	Associate degree	n/%*	57 (43%)	63 (59%)	100 (66%)	
	Undergraduate degree	n/%*	62 (47%)	37 (35%)	39 (27%)	
	Postgraduate degree	n/%*	9 (7%)	6 (6%)	2 (1%)	
Years of employment	1-10 years	n/%*	76 (57%)	79 (74%)	121 (83%)	0.000
	11-20 years	n/%*	40 (30%)	20 (19%)	18 (12%)	
	21-30 years	n/%*	17 (13%)	8 (8%)	6 (4%)	
Institution of employment	Unemployed	n/%*	2 (2%)	5 (5%)	3 (2%)	0.000
	State hospital	n/%*	31 (23%)	29 (27%)	33 (23%)	
	Education and research hospital	n/%*	33 (25%)	31 (29%)	29 (20%)	
	Private hospital	n/%*	27 (20%)	15 (14%)	53 (37%)	
	City hospital	n/%*	19 (14%)	17 (16%)	10 (7%)	
	University hospital	n/%*	21 (16%)	10 (9%)	17 (12%)	

* %s are percentages of column. ** Gender was tested with Mann-Whitney U, others were tested with Kruskal-Wallis H

Table 4. Stress and increased anxiety of participants during anaesthesia of paediatric patients

Sociodemographic characteristics			Yes	No	Undecided	p**
Gender	Male	n/%*	77(29%)	13(19)	10(20%)	0.173
	Female	n/%*	191 (71%)	55 (81%)	39 (80%)	
Age	20-24 years	n/%*	76 (28%)	21 (31%)	10 (20%)	0.319
	25-29 years	n/%*	97 (36%)	25 (37%)	24 (49%)	
	30-34 years	n/%*	38 (14%)	4 (6%)	5 (10%)	
	35 years and higher	n/%*	57 (21%)	18 (27%)	10 (20%)	
Educational status	Vocational health school	n/%*	6 (2%)	3 (4%)	1 (2%)	0.909
	Associate degree	n/%*	154 (58%)	40 (59%)	26 (53%)	
	Undergraduate degree	n/%*	95 (35%)	23 (34%)	20 (41%)	
	Postgraduate degree	n/%*	13 (5%)	2 (3%)	2 (4%)	
Years of employment	1-10 years	n/%*	190 (71%)	50 (74%)	36 (74%)	0.424
	11-20 years	n/%*	52 (19%)	16 (24%)	10 (20%)	
	21-30 years	n/%*	26 (10%)	2 (3%)	3 (6%)	
Institution of employment	Unemployed	n/%*	7 (3%)	1 (2%)	2 (4%)	0.442
	State hospital	n/%*	69 (26%)	12 (18%)	12 (25%)	
	Education and research hospital	n/%*	60 (22%)	21 (31%)	12 (25%)	
	Private hospital	n/%*	62 (23%)	21 (31%)	12 (25%)	
	City hospital	n/%*	34 (13%)	4 (6%)	8 (16%)	
	University hospital	n/%*	36 (13%)	9 (13%)	3 (6%)	

*%s are percentages of column. ** Gender was tested with Mann-Whitney U, others were tested with Kruskal-Wallis H



DISCUSSION

Paediatric anaesthesia is a field that requires special knowledge, more attention, sensitivity and skill to provide safe anaesthesia for paediatric patients during diagnostic, surgical and therapeutic procedures. A good knowledge of the paediatric differences of the patients, starting from the anaesthetic consent to the termination of anaesthesia, is known as the most basic rule of successful and safe anaesthesia practice. A coordinated team work of the process of premedication and taking patients to the operating rooms, daily paediatric anaesthesia method, drug and dose adjustments appropriate to the anaesthesia method selected, selection of appropriate equipment for the paediatric patient, initiation, maintenance and termination of anaesthesia are important points of the field. Due to all these characteristics, paediatric anaesthesia can cause extra stress and anxiety in the working team. One of the members of this team is anaesthesia technician.

“Anaesthesia technician” title was given to individuals who graduated the department of anaesthesia in vocational health schools before the year 2017 and to individuals who got a two-year associate degree starting from year 2017. In European countries, the title of ‘anaesthesia nurse’ is awarded after undergoing various trainings.⁵ In our literature review, there was only a limited number of scientific studies on the clinical approaches and knowledge levels of anaesthesia technicians.

Almost all of the participants in the present study stated that paediatric/neonatal surgeries were performed in the hospital where they worked and that there was no specific age or weight restriction. In a study conducted in a public hospital on postoperative pain in paediatric patients, 56.5% of the 2420 paediatric patients included in the study were in the 3-6 age group.⁶

Of the participants in the present study, it was found that 76.9% had not received in-service training on paediatric anaesthesia, while 61% reported that they had not received trainings called NRP, CHILYAD, EPALS. Drzymalski⁷ stated that although most of the anaesthetist working in obstetrics were involved in resuscitation of a new-born baby, most of them did not receive NRP training. According to a study conducted in low- and middle-income countries, the paediatric skills of the anaesthesia workforce, including non-physician anaesthesia workers, should be improved.⁸ Boyd et al.⁹ tried to meet the need in education by organising “The Safer Anaesthesia from Education (SAFE)” course in five countries in Eastern and Central Africa due to inadequate training of paediatric anaesthesiologists. According to a study conducted in Italy, most of the health professionals who took the Advanced Paediatric Life Support (APLS) course, those working in hospital settings, thought that the systematic methods learned had a great impact on clinical practice.¹⁰

In the present study, 27.8% of the participants stated that they considered themselves incompetent in knowing about the doses of drugs used in emergencies for paediatric patients. It was reported that 51.9% considered themselves competent about drug doses used in paediatric anaesthesia. Kaufmann

et al.¹¹ reported that 60% of the paediatric anaesthetists experienced at least one paediatric error in a year and 15% had a higher rate of error at least once a month. However, it is emphasized that there are problems about reporting errors and an exact number cannot be determined. In another study conducted with an anaesthetics team of senior anaesthetists, nurse anaesthetists and operating room nurses, it was reported that errors of medication were not few in paediatric general anaesthesia, at least one medication error occurred in 38 general anaesthesia cases and these errors were mostly errors of incorrect dose and dilution errors.¹²

In the study, 48.3% of the participants reported that monitoring anaesthesia maintenance in paediatric anaesthesia was made with 2 people at the same time, while 86.5% reported that they sometimes had to monitor patients alone. Newton¹³ reported that paediatric anaesthesia was mostly performed by anaesthesia workers who were non-physician anaesthesiologists. In another study, it was reported that at least one adverse event related to sedation of children was experienced in 20.1% of the practices performed by non-anaesthetists for diagnostic and therapeutic purposes and risks related with children’s sedation was emphasized, drawing attention to the importance of appropriate monitoring by educated staff.¹⁴

It was found that 69.9% of the participants and 71% of female participants stated they experienced stress and anxiety during paediatric patient anaesthesia. Kızılcı¹⁵ reported that dentists who took care of paediatric patients experienced more stress while treating patients under deep sedation. In another study, anaesthetists reported that burnout was common and workplace factors had a great role.¹⁶ In a study conducted with anaesthesia assistants, women were reported to have high burnout risk.¹⁷ Similar stress and anxiety were reported in the present study, in parallel with other studies, and it was reported that 48.8% of the participants did not want to work in paediatric surgery rooms.

Limitations

As with most studies, our current study has limitations. Participants in our survey may not have participated in the study due to the fact that elderly anesthesia technicians use social media less because they participated in the survey form via social media. The inability to reach the opinions of this group, which is especially experienced, about pediatric patients can be considered among the limitations of our study.

CONCLUSION

In terms of sociodemographic characterises, it was found in the present study that a great majority of the participants were female and within the 25-29 age group, more than half were single, more than two thirds did not have children, more than half had associate degree, more than two thirds had worked between 1 and 10 years. In terms of hospitals the participants worked in, there were participants from all hospital groups and in terms of regions where the participants lived in, there were nurses from all regions of the country.



As a result of the present study, it was found that anaesthesia technicians had not received in-service training such as NRP, CHILYAD, EPALS and almost half did not consider themselves sufficient in terms of paediatric anaesthesia. It was determined that anaesthesia technicians experienced stress and increased anxiety during anaesthesia of paediatric patients, did not want to work in paediatric operating rooms, and they did not feel safe in environments where anaesthesia was given outside the operating room. It is thought that giving trainings to anaesthesia technicians to increase their knowledge about paediatric anaesthesia, arranging the anaesthesia environment outside the operating room according to ASA (American Society of Anaesthesiologists) criteria, making it closest to the operating room conditions with adequate equipment and materials may be beneficial and stress and increased anxiety levels may be reduced.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study has been approved by the Ethics Committee of the Faculty of Social and Human Sciences at Yozgat Bozok University with specific attention to the inclusion of vulnerable participants (e.g., children, pregnant women, individuals with disabilities) (Date: 13.09.2024, Decision No: 251964). Additional safeguards were reviewed and approved by the committee.

Informed Consent

Informed consent was obtained from a parent or legal guardian. Where appropriate, age-adjusted assent was also obtained from the child. The inclusion of vulnerable populations in this study adhered to national and international ethical guidelines. Extra care was taken to ensure voluntary participation, understanding, and protection of participant dignity and autonomy.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

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Author Contributions

Concept: N.U.K., S.S., Y.A.Ş.; Design: N.U.K., S.S.; Control/Supervision: Y.A.Ş.; Data collection and/or processing: N.U.K., S.S.; Analysis and/or interpretation: S.S., Y.A.Ş.; Literature review: N.U.K., S.S.; Article writing: N.U.K., S.S., Y.A.Ş.; Critical review: All authors

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