Praxis of Otorhinolaryngology 2026;14(3):135-150

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ORIGINAL ARTICLE

Antibiotic prophylaxis practices in otorhinolaryngology: A National Cross-Sectional Survey from Türkiye

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ABSTRACT

Objectives: The aim of this study is to evaluate the antibiotic prophylaxis practices of otorhinolaryngologists in Türkiye in different surgical operations and to assess the correlation between these approaches and the type of institution, title, professional experience, and beliefs about prophylaxis.

Patients and Methods: This study was designed as a cross-sectional, questionnaire-based, and observational study between July 2025 and December 2025. Data were collected using a questionnaire administered via Google Forms. The questionnaire consisted of 29 questions inquiring about demographic information, preferences for prophylaxis application in various surgical procedures, antibiotic selection, duration of use, and institutional protocols. Categorical data were presented as frequencies and percentages, and intergroup comparisons were made using the Fisher-Freeman-Halton test.

Results: A total of 129 otorhinolaryngologists participated in the study. 40.3% of the participants worked in training and research hospitals, and 27.1% worked in university hospitals. Cefazolin was the most frequently preferred antibiotic during the preoperative (61.3%) and intraoperative (68.6%) periods, while amoxicillin-clavulanate was the most frequently preferred antibiotic in the postoperative period (37.5%). Postoperative antibiotic use was frequently prolonged, with 53.7% stating that they continued prophylaxis for 6-7 days. A significant difference was observed between preoperative ($p = 0.008$) and postoperative ($p = 0.003$) antibiotic preferences according to institution. Differences according to title ($p = 0.003$) and professional experience ($p = 0.002$) were only found in the preoperative period. There was no significant relationship between the presence of a written prophylaxis protocol and antibiotic preferences.

Conclusion: In Türkiye, antibiotic prophylaxis practices in otorhinolaryngology can vary depending on the type of disease, institutional characteristics, and physician experience. The frequent and prolonged use of postoperative antibiotics suggests a significant discrepancy between current guideline recommendations and clinical practices.

Keywords: Antibiotic prophylaxis, antimicrobial resistance, otorhinolaryngology, surgical site infection, survey study.

Surgical site infections are one of the most common healthcare-associated complications worldwide and are associated with substantial increases in morbidity, mortality, length of hospital stay, and healthcare costs.[1] Surgical antibiotic prophylaxis is defined as the administration of an appropriate antimicrobial agent before contamination occurs in tissues and body fluids that are initially sterile.[2] Its primary objective is to eliminate transient microorganisms that may colonize the surgical field during the procedure and to suppress the proliferation of bacteria belonging to the resident flora, thereby preventing

Received: July 07, 2026
Accepted: July 30, 2026
Published online: September 09, 2026

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Doi: https://doi.org/10.5606/kbbu.2026.44

Citation:
Tetik F. Antibiotic prophylaxis practices in otorhinolaryngology: A National Cross-Sectional Survey from Türkiye. Praxis Otorhinolaryngol 2026;14(3):135-150. https://doi.org/10.5606/kbbu.2026.44.

the development of surgical site infections.[3] Antibiotic prophylaxis is particularly recommended for procedures associated with a high risk of infection or for operations in which postoperative infections may lead to serious morbidity or mortality, even when the baseline risk of infection is low. Surgical wound classification is one of the principal factors guiding antibiotic prophylaxis decisions. Surgical wounds are categorized into four main groups: clean, clean-contaminated, contaminated, and dirty wounds.[4] This classification serves as a practical guide for estimating the risk of surgical site infection and determining the most appropriate prophylactic strategy.

Elective otorhinolaryngologic procedures are predominantly classified as either clean or clean-contaminated surgeries. Procedures such as thyroidectomy, parotidectomy, and neck dissection are considered clean surgeries. Clean-contaminated procedures encompass a broad spectrum of operations, ranging from minor interventions such as adenoidectomy, tonsillectomy, and septoplasty to extensive resections and reconstructive surgeries performed for head and neck malignancies. This heterogeneity makes it challenging to standardize approaches to antibiotic prophylaxis.[5] Nevertheless, clinical decision-making is influenced not only by guideline recommendations but also by institutional culture, medicolegal concerns, clinical experience, and individual beliefs.[6]

Data evaluating antibiotic prophylaxis practices in otorhinolaryngologic surgery in Türkiye across a broad range of surgical procedures and healthcare settings remain limited. Unlike previous survey-based studies that generally focused on a limited number of procedures or a specific subspecialty, the present study simultaneously evaluated prophylaxis timing, antibiotic agent preference, postoperative duration, institution type, professional title, clinical experience, beliefs regarding prophylaxis, and the availability of written institutional protocols across a broad spectrum of otorhinolaryngologic procedures. Therefore, this study aimed to provide a comprehensive overview of current antibiotic prophylaxis practices among actively practicing otorhinolaryngologists in Türkiye and to examine how these practices varied according to physician-and institution-related characteristics.

PATIENTS AND METHODS

This cross-sectional, observational, survey-based study was conducted at Health Sciences University, Gaziosmanpaşa Training and Research Hospital, Department of Otolaryngology, between July 2025 and December 2025. The study protocol was approved by the Gaziosmanpaşa Training and Research Hospital Ethics Committee (Date: 30.04.2025, No: 56). The study was conducted in accordance with the principles of the Declaration of Helsinki. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement for cross-sectional studies. Participants were eligible for inclusion if they were actively practicing otorhinolaryngologists in Türkiye and voluntarily agreed to participate in the study. Duplicate responses and responses from physicians outside the field of otorhinolaryngology were excluded. Participants proceeded to the survey after reading the informed consent information provided on the first page. Completion of the questionnaire was considered to indicate informed consent.

A priori power analysis was performed to determine the required sample size for the study. The analysis indicated that a minimum of 85 participants was required to achieve 80% statistical power (effect size = 0.36, $\alpha = 0.05$, $1-\beta = 0.80$, df = 3).

Questionnaires containing sufficient information for the primary study variables were included in the analysis. Since some questions were conditional or were not answered by all participants, the number of valid responses varied across individual survey items.

No restrictions were applied regarding the type of institution, academic title, or years of professional experience. The survey link was distributed by the investigators through professional communication groups and individual communication channels. Participants were asked to share the survey with their colleagues, thereby utilizing a distribution strategy similar to snowball sampling.

Data were collected using a structured questionnaire developed by the investigators and administered through the Google Forms (Google LLC, Mountain View, CA, USA) platform. The survey was conducted anonymously, and no personally identifiable information was collected in order to protect participant confidentiality and minimize information bias. Nevertheless, as participation was voluntary and the survey was distributed using a strategy similar to snowball sampling, selection bias and response bias cannot be completely excluded. Furthermore, as the data were based on self-reported responses, discrepancies may exist between reported practices and actual clinical practice.

Participants were asked about their institutional affiliation (university hospital, training and research hospital, state hospital, private hospital, or private practice), professional title (resident, specialist, assistant professor, associate professor, or professor), and years of clinical experience in otorhinolaryngology (0-5, 6-10, 11-15, 16-20, and > 20 years).

Participants were asked to indicate their preferences regarding antibiotic prophylaxis for the following procedures: adenoidectomy, tonsillectomy (pediatric and adult), adenotonsillectomy, ventilation tube insertion, septoplasty (open and closed techniques), septorhinoplasty, endoscopic sinus surgery, tympanoplasty, simple mastoidectomy, radical mastoidectomy, parotidectomy, thyroidectomy, uncomplicated neck mass excision, primary neck dissection, head and neck cancer surgery performed in conjunction with neck dissection, and complex oncologic procedures requiring locoregional or free-flap reconstruction.

For each surgical procedure, participants could select one or more of the following options: no antibiotic prophylaxis, preoperative prophylaxis, intraoperative prophylaxis, and postoperative prophylaxis. Multiple selections were allowed to capture variations in prophylaxis timing and to better reflect real-world clinical practice.

Participants who reported using antibiotic prophylaxis were asked to indicate their preferred antibiotic agents for the preoperative, intraoperative, and postoperative periods. Information was also collected regarding the usual duration of postoperative antibiotic prophylaxis (24 h, 2-5 days, 6-7 days, 8-10 days, or > 10 days). Percentages for these variables were calculated using the number of responses available for the corresponding item as the denominator, and item-specific denominators are reported in the tables.

Participants were also asked whether a written protocol for antibiotic prophylaxis was available at their institution. Additionally, their beliefs regarding the effectiveness of antibiotic prophylaxis in reducing postoperative infection rates and their corresponding clinical practices were assessed.

Statistical analysis

Comparisons between categorical variables were performed using the Fisher-Freeman-Halton test. Descriptive statistics were presented as frequencies and percentages. All statistical analyses were conducted using IBM SPSS Statistics version 29.0.2 software (IBM Corp., Armonk, NY, USA), and a two-sided p-value <0.05 was considered statistically significant.

RESULTS

Participant characteristics and general approach

Since the survey link was distributed through professional communication groups and shared among colleagues using a snowball sampling-like strategy, the total number of physicians who received the survey invitation could not be determined. Therefore, a response rate could not be calculated. After the exclusion of ineligible or duplicate responses, 129 participants were included in the final analysis. The number of valid responses varied across individual survey items, as some questions were conditional or were not answered by all participants.

Participants were primarily affiliated with training and research hospitals (40.3%) and university hospitals (27.1%). Specialists constituted 44.2% of the sample, and professional experience was evenly distributed across seniority groups. Overall, 46.1% of participants stated that no written antibiotic prophylaxis protocol was available at their institution, and 32.0% were unsure.

Regarding antibiotic preferences, cefazolin was the most frequently selected agent in both the preoperative (61.3%) and intraoperative (68.6%) periods, whereas amoxicillin–clavulanate was the most frequently selected agent in the postoperative period (37.5%). Regarding the duration of postoperative antibiotic use, 53.7% of participants reported prescribing antibiotics for 6-7 days.

Regarding beliefs about the effectiveness of antibiotic prophylaxis, 64.3% of participants reported believing that prophylaxis reduced postoperative infection rates and routinely used it in practice. Conversely, 31.0% reported using antibiotic prophylaxis despite believing that it did not reduce infection rates. Demographic and clinical characteristics of the participants are presented in Table 1.

Antibiotic prophylaxis practices according to surgical procedure

The rates of antibiotic prophylaxis use varied across surgical procedures. Among procedures with lower reported prophylaxis use, 57.7% of participants reported administering prophylaxis during at least one perioperative period for adenoidectomy, while 52.5% reported doing so for ventilation tube insertion. In tonsillectomy, the corresponding rates were 67.5% for pediatric patients and 72.4% for adult patients. Higher rates of prophylaxis use were reported for septorhinoplasty, endoscopic sinus surgery, tympanoplasty, and mastoidectomy. The highest

Table 1. Demographic and clinical characteristics of the participants

Characteristic	n	%
Institution type (n = 129)		
University Hospital	35	27.1
Training and Research Hospital	52	40.3
State Hospital	14	10.9
Private Hospital	14	10.9
Private Practice	14	10.9
Professional title (n = 129)		
Resident	31	24.0
Specialist	57	44.2
Assistant professor	16	12.4
Associate professor	12	9.3
Professor	13	10.1
Professional experience in otorhinolaryngology (years) (n = 129)		
0-5	34	26.4
6-10	31	24.0
11-15	28	21.7
16-20	16	12.4
>20	20	15.5
Availability of a written antibiotic prophylaxis protocol (n = 128)		
No	59	46.1
Yes	28	21.9
Unsure	41	32.0
Preferred preoperative antibiotic (n = 119)		
None	1	0.8
Cefazolin	73	61.3
Ampicillin-sulbactam	20	16.8
Amoxicillin-clavulanate	8	6.7
Ceftriaxone	16	13.4
Cefixime	1	0.8
Preferred intraoperative antibiotic (n = 118)		
Cefazolin	81	68.6
Ampicillin-sulbactam	15	12.7
Amoxicillin-clavulanate	2	1.7
Ceftriaxone	19	16.1
Cefuroxime	1	0.8
Preferred postoperative antibiotic (n = 120)		
Cefazolin	25	20.8
Ampicillin-sulbactam	26	21.7
Amoxicillin-clavulanate	45	37.5
Ceftriaxone	16	13.3
Cefdinir	2	1.7
Ciprofloxacin	4	3.3
Other	2	1.7
Duration of postoperative antibiotic use (n = 123)		
24 hours	11	8.9
2-5 days	20	16.3
6-7 days	66	53.7
8-10 days	22	17.9
> 10 days	4	3.3
Belief in the effectiveness of antibiotic prophylaxis for reducing postoperative infections (n = 126)		
Yes, and I routinely use it	81	64.3
No, but I still use it	39	31
No, and I do not use it	2	1.6
Undecided	4	3.2

Percentages were calculated using the number of responses available for each item as the denominator. Denominators varied since some questions were conditional or were not answered by all participants. Item-specific denominators are provided in the corresponding section headings.

Table 2. Distribution of antibiotic prophylaxis practices according to surgical procedure

	Respondents	No prophylaxis		Any prophylaxis		Preoperative		Intraoperative		Postoperative	
Procedure	n	n	%	n	%	n	%	n	%	n	%
Adenoidectomy	123	52	42.3	71	57.7	31	25.2	22	17.9	48	39.0
Pediatric tonsillectomy	123	40	32.5	83	67.5	33	26.8	23	18.7	56	45.5
Adult tonsillectomy	123	34	27.6	89	72.4	37	30.1	24	19.5	57	46.3
Ventilation tube insertion	118	56	47.5	62	52.5	23	19.5	16	13.6	40	33.
Adenoidectomy + ventilation tube insertion	124	43	34.7	81	65.3	30	24.2	21	16.9	58	46.8
Adenotonsillectomy	122	38	31.1	84	68.9	33	27.0	23	18.9	58	47.5
Adenotonsillectomy + ventilation tube insertion	124	37	29.8	87	70.2	33	26.6	23	18.5	62	50.0
Closed septoplasty	124	28	22.6	96	77.4	36	29.0	26	21.0	72	58.1
Open septoplasty	123	19	15.4	104	84.6	44	35.8	30	24.4	72	58.5
Septorhinoplasty	123	15	12.2	108	87.8	47	38.2	34	27.6	70	56.9
Endoscopic sinus surgery	120	22	18.3	98	81.7	40	33.0	31	25.8	70	58.3
Tympanoplasty	121	24	19.8	97	80.2	36	29.8	30	24.8	69	57.0
Simple mastoidectomy	112	16	14.3	96	85.7	40	35.7	31	27.7	61	54.5
Radical mastoidectomy	110	14	12.7	96	87.3	42	38.2	34	30.9	59	53.6
Parotidectomy	111	16	14.4	95	85.6	40	36.0	31	27.9	62	55.9
Thyroidectomy	106	18	17.0	88	83.0	35	33.0	28	26.4	58	54.7
Uncomplicated neck mass excision	113	28	24.8	85	75.2	33	29.2	27	23.9	58	51.3
Primary neck dissection	108	9	8.3	99	91.7	43	39.4	41	37.6	62	56.9
Oral cavity, oropharyngeal, laryngeal surgery and neck dissection	107	6	5.6	101	94.4	50	46.3	45	41.7	60	55.6
Surgery requiring locoregional or free-flap reconstruction	107	9	8.4	98	91.6	50	46.7	44	41.1	60	56.1

Data are presented as frequency and percentage of valid responses for each procedure. Multiple responses were permitted for prophylaxis timing; therefore, the preoperative, intraoperative, and postoperative categories are not mutually exclusive and their percentages may sum to more than 100%. “Any prophylaxis” was defined as the selection of at least one of the preoperative, intraoperative, or postoperative periods.

Table 3. Comparison of preferred preoperative, intraoperative, and postoperative antibiotics according to institution type

	Institution type										
	University Hospital		Training and Research Hospital		State Hospital		Private Hospital		Private Practice		
	n	%	n	%	n	%	n	%	n	%	*p*
Preoperative antibiotic											**0.008**
None	0	0.0	0	0.0	0	0.0	1	8.3	0	0.0	
Cefazolin	15	46.9	29	58.0	10	71.4	10	83.3	9	81.8	
Ampicillin-sulbactam	4	12.5	13	26.0	2	14.3	0	0.0	1	9.1	
Amoxicillin-clavulanate	5	15.6	2	4.0	1	7.1	0	0.0	0	0.0	
Ceftriaxone	8	25.0	6	12.0	1	7.1	1	8.3	0	0.0	
Cefixime	0	0.0	0	0.0	0	0.0	0	0.0	1	9.1	
Intraoperative antibiotic											0.261
Cefazolin	22	68.8	25	54.3	11	84.6	10	71.4	13	100.0	
Ampicillin-sulbactam	4	12.5	9	19.6	0	0.0	2	14.3	0	0.0	
Amoxicillin-clavulanate	1	3.1	0	0.0	1	7.7	0	0.0	0	0.0	
Ceftriaxone	5	15.6	11	23.9	1	7.7	2	14.3	0	0.0	
Cefuroxime	0	0.0	1	2.2	0	0.0	0	0.0	0	0.0	
Postoperative antibiotic											**0.003**
Cefazolin	5	16.1	6	12.2	5	38.5	6	42.9	3	23.1	
Ampicillin-sulbactam	5	16.1	16	32.7	2	15.4	1	7.1	2	15.4	
Amoxicillin-clavulanate	12	38.7	21	42.9	3	23.1	5	35.7	4	30.8	
Ceftriaxone	8	25.8	4	8.2	2	15.4	2	14.3	0	0.0	
Cefdinir	0	0.0	2	4.1	0	0.0	0	0.0	0	0.0	
Ciprofloxacin	1	3.2	0	0.0	0	0.0	0	0.0	3	23.1	
Other	0	0.0	0	0.0	1	7.7	0	0.0	1	7.7	

Percentages were calculated within each institution category using the number of valid responses to the relevant antibiotic preference item as the denominator. Item-specific denominators are shown separately for the preoperative, intraoperative, and postoperative periods. P-values were calculated using the Fisher-Freeman-Halton test.

Table 4. Comparison of preferred preoperative, intraoperative, and postoperative antibiotics according to professional title

	Professional title										
	Resident		Specialist		Assistant professor		Associate professor		Professor		
	n	%	n	%	n	%	n	%	n	%	*p*
Preoperative antibiotic											**0.003**
None	0	0.0	0	0.0	0	0.0	0	0.0	1	9.1	
Cefazolin	9	30.0	39	73.6	11	73.3	8	80.0	6	54.5	
Ampicillin-sulbactam	8	26.7	7	13.2	2	13.3	1	10.0	2	18.2	
Amoxicillin-clavulanate	4	13.3	2	3.8	1	6.7	1	10.0	0	0.0	
Ceftriaxone	9	30.0	5	9.4	1	6.7	0	0.0	1	9.1	
Cefixime	0	0.0	0	0.0	0	0.0	0	0.0	1	9.1	
Intraoperative antibiotic											0.494
Cefazolin	15	53.6	37	69.8	9	64.3	10	90.9	10	83.3	
Ampicillin-sulbactam	5	17.9	5	9.4	4	28.6	0	0.0	1	8.3	
Amoxicillin-clavulanate	0	0.0	2	3.8	0	0.0	0	0.0	0	0.0	
Ceftriaxone	8	28.6	8	15.1	1	7.1	1	9.1	1	8.3	
Cefuroxime	0	0.0	1	1.9	0	0.0	0	0.0	0	0.0	
Postoperative antibiotic											0.181
Cefazolin	1	3.6	11	20.4	4	28.6	4	33.3	5	41.7	
Ampicillin-sulbactam	7	25.0	10	18.5	5	35.7	2	16.7	2	16.7	
Amoxicillin-clavulanate	11	39.3	20	37	5	35.7	5	41.7	4	33.3	
Ceftriaxone	9	32.1	5	9.3	0	0.0	1	8.3	1	8.3	
Cefdinir	0	0.0	2	3.7	0	0.0	0	0.0	0	0.0	
Ciprofloxacin	0	0.0	4	7.4	0	0.0	0	0.0	0	0.0	
Other	0	0.0	2	3.7	0	0.0	0	0.0	0	0.0	

Percentages were calculated within each professional title category using the number of valid responses to the relevant perioperative antibiotic preference item as the denominator. Since item-specific response numbers varied, denominators may differ from the total number of participants in each professional title category. P-values were calculated using the Fisher-Freeman-Halton test.

Table 5. Comparison of preferred preoperative, intraoperative, and postoperative antibiotics according to professional experience

	Professional experience										
	0-5 years		6-10 years		11-15 years		16-20 years		>20 years		
	n	%	n	%	n	%	n	%	n	%	*p*
Preoperative antibiotic											
None	0	0.0	0	0.0	0	0.0	0	0.0	1	6.7	**0.002**
Cefazolin	11	33.3	22	71.0	21	84	12	80.0	7	46.7	
Ampicillin-sulbactam	9	27.3	5	16.1	1	4.0	2	13.3	3	20.0	
Amoxicillin-clavulanate	4	12.1	0	0.0	3	12.0	0	0.0	1	6.7	
Ceftriaxone	9	27.3	4	12.9	0	0.0	0	0.0	3	20.0	
Cefixime	0	0.0	0	0.0	0	0.0	0	0..0	1	6.7	
Intraoperative antibiotic											
Cefazolin	18	58.1	20	66.7	19	73.1	13	92.9	11	64.7	0.276
Ampicillin-sulbactam	5	16.1	3	10.0	4	15.4	1	7.1	2	11.8	
Amoxicillin-clavulanate	0	0.0	0	0.0	1	3.8	0	0.0	1	5.9	
Ceftriaxone	8	25.8	7	23.3	2	7.7	0	0.0	2	11.8	
Cefuroxime	0	0.0	0	0.0	0	0.0	0	0.0	1	5.9	
Postoperative antibiotic											
Cefazolin	2	6.5	6	20.0	6	22.2	7	46.7	4	23.5	0.142
Ampicillin-sulbactam	7	22.6	8	26.7	7	25.9	2	13.3	2	11.8	
Amoxicillin-clavulanate	11	35.5	11	36.7	10	37	4	26.7	9	52.9	
Ceftriaxone	10	32.3	3	10.0	2	7.4	0	0.0	1	5.9	
Cefdinir	1	3.2	1	3.3	0	0.0	0	0.0	0	0.0	
Ciprofloxacin	0	0.0	1	3.3	1	3.7	1	6.7	1	5.9	
Other	0	0.0	0	0.0	1	3.7	1	6.7	0	0.0	

Percentages were calculated within each professional experience category using the number of valid responses to the relevant perioperative antibiotic preference item as the denominator. Accordingly, denominators differ across the preoperative, intraoperative, and postoperative sections. P-values were calculated using the Fisher-Freeman-Halton test.

rates were observed in head and neck oncologic procedures, with prophylaxis being reported during at least one perioperative period by 91.7% of participants for primary neck dissection, 94.4% for oral cavity, oropharyngeal, and laryngeal surgery, and 91.6% for procedures requiring flap reconstruction. With regard to timing, postoperative administration was the most commonly reported approach across many procedure types. Antibiotic prophylaxis rates according to surgical procedure are presented in Table 2.

Distribution of antibiotic preferences according to institution type, professional title, clinical experience, and availability of a written protocol

Preoperative (p = 0.008) and postoperative (p = 0.003) antibiotic preferences differed significantly according to institution type, whereas no significant difference was observed for intraoperative antibiotic preferences (p = 0.261). Although cefazolin was the most commonly preferred antibiotic in the preoperative period overall, its use was less frequent in university hospitals (46.9%) and more frequent in state hospitals (71.4%), private hospitals (83.3%), and private practices (81.8%). Alternative agents, including ceftriaxone and amoxicillin-clavulanate, were preferred more frequently in university hospitals, whereas ampicillin-sulbactam use was more common in training and research hospitals. In the postoperative period, amoxicillin-clavulanate was more frequently preferred in university hospitals and training and research hospitals, whereas cefazolin use was more common in state and private hospitals, as shown in Table 3.

According to professional title, a significant difference was observed only in preoperative antibiotic

Table 6. Comparison of preferred preoperative, intraoperative, and postoperative antibiotics according to availability of a written antibiotic prophylaxis protocol

	Written protocol information						
	No		Yes		Unsure		
	n	%	n	%	n	%	p
Preoperative antibiotic							
None	1	1.8	0	0.0	0	0.0	0.513
Cefazolin	33	58.9	17	68	23	62.2	
Ampicillin-sulbactam	12	21.4	2	8.0	6	16.2	
Amoxicillin-clavulanate	5	8.9	1	4.0	1	2.7	
Ceftriaxone	4	7.1	5	20.0	7	18.9	
Cefixime	1	1.8	0	0.0	0	0.0	
Intraoperative antibiotic							
Cefazolin	41	69.5	15	60.0	25	73.5	0.568
Ampicillin-sulbactam	9	15.3	3	12.0	3	8.8	
Amoxicillin-clavulanate	1	1.7	1	4.0	0	0.0	
Ceftriaxone	8	13.6	5	20.0	6	17.6	
Cefuroxime	0	0.0	1	4.0	0	0.0	
Postoperative antibiotic							
Cefazolin	14	24.1	8	32.0	3	8.1	0.555
Ampicillin-sulbactam	12	20.7	4	16.0	10	27.0	
Amoxicillin-clavulanate	22	37.9	8	32.0	15	40.5	
Ceftriaxone	5	8.6	4	16.0	7	18.9	
Cefdinir	1	1.7	0	0.0	1	2.7	
Ciprofloxacin	2	3.4	1	4.0	1	2.7	
Other	2	3.4	0	0.0	0	0.0	

Percentages were calculated within each written protocol category using the number of valid responses to the relevant perioperative antibiotic preference item as the denominator. Accordingly, denominators differ across the preoperative, intraoperative, and postoperative sections. P-values were calculated using the Fisher-Freeman-Halton test.

Table 7. Comparison of postoperative antibiotic prophylaxis duration according to institution type, professional title, professional experience, and availability of a written protocol

	Post-operative period										
	24 Hours		2-5 Days		6-7 Days		8-10 Days		>10 Days		
	n	%	n	%	n	%	n	%	n	%	*p*
Institution type											
University Hospital	1	3.2	6	19.4	14	45.2	8	25.8	2	6.5	0.704
Training and Research Hospital	5	9.8	6	11.8	33	64.7	7	13.7	0	0.0	
State Hospital	2	15.4	4	30.8	5	38.5	2	15.4	0	0.0	
Private Hospital	3	21.4	2	14.3	5	35.7	3	21.4	1	7.1	
Private Practice	0	0.0	2	14.3	9	64.3	2	14.3	1	7.1	
Professional title											
Resident	3	10.7	2	7.1	17	60.7	4	14.3	2	7.1	0.441
Specialist	5	8.9	9	16.1	31	55.4	9	16.1	2	3.6	
Assistant Professor	0	0.0	2	13.3	11	73.3	2	13.3	0	0.0	
Associate Professor	2	16.7	3	25.0	4	33.3	3	25.0	0	0.0	
Professor	1	8.3	4	33.3	3	25.0	4	33.3	0	0.0	
Professional experience (years)											
0-5	3	10.0	2	6.7	19	63.3	4	13.3	2	6.7	0.291
6-10	4	12.9	4	12.9	17	54.8	4	12.9	2	6.5	
11-15	2	7.4	4	14.8	13	48.1	8	29.6	0	0.0	
16-20	1	6.2	3	18.8	8	50.0	4	25.0	0	0.0	
> 20	1	5.3	7	36.8	9	47.4	2	10.5	0	0.0	
Availability of a written antibiotic prophylaxis protocol											
No	2	3.4	7	12.1	33	56.9	13	22.4	3	5.2	0.710
Yes	5	19.2	8	30.8	11	42.3	2	7.7	0	0.0	
Unsure	4	10.3	5	12.8	22	56.4	7	17.9	1	2.6	

Percentages were calculated within each institution, professional title, professional experience, and written protocol category using the number of valid responses to the postoperative antibiotic duration item as the denominator. *P*-values were calculated using the Fisher-Freeman-Halton test.

preferences (p = 0.003). Antibiotic selection was more heterogeneous among resident physicians, whereas cefazolin preference was more pronounced among specialists and participants holding more senior academic positions. No significant differences according to professional title were observed for intraoperative or postoperative antibiotic preferences (p = 0.494 and p = 0.181, respectively), as shown in Table 4.

Similarly, a significant difference among professional experience groups was observed only for preoperative antibiotic preferences (p = 0.002). No significant differences according to professional experience were observed for intraoperative or postoperative antibiotic preferences (p = 0.276 and p = 0.142, respectively), as shown in Table 5.

No significant association was observed between the availability of a written antibiotic prophylaxis protocol and antibiotic preferences in any perioperative period (preoperative p = 0.513, intraoperative p = 0.568, and postoperative p = 0.555). Similarly, no significant differences were found in the duration of postoperative antibiotic use according to institution type, professional title, clinical experience, or the availability of a written antibiotic prophylaxis protocol (all $p > 0.05$), as shown in Tables 6 and 7.

DISCUSSION

The incidence of surgical site infections following clean head and neck procedures is generally below 5% and has been reported to be as low as 0.56% in certain series.[7,8] Due to this low incidence, no randomized controlled trials have demonstrated a benefit of prophylactic antibiotic use, and available retrospective cohort studies have likewise failed to demonstrate a significant reduction in infection rates.[7-9] Accordingly, routine antibiotic prophylaxis is not recommended for clean surgical procedures.[4,10,11] Despite these recommendations, 83.0% of participants in our study reported using antibiotic prophylaxis during at least one perioperative period for thyroidectomy, 85.6% for parotidectomy, and 75.2% for uncomplicated neck mass excision. The corresponding rate was 91.7% for primary neck dissection. Postoperative prophylaxis rates exceeded 50% across all evaluated head and neck procedures. These findings suggest that, in routine clinical practice, antibiotic prophylaxis is used more broadly and for longer durations than recommended by current guidelines, even in clean surgical procedures.

The risk of surgical site infection is substantially higher in clean-contaminated head and neck procedures (24-87%).[12,13] In this setting, numerous randomized controlled trials and meta-analyses have demonstrated that perioperative antibiotic prophylaxis reduces postoperative infectious complications.[14-16] However, clean-contaminated procedures in otorhinolaryngology encompass a highly heterogeneous group of operations. Consequently, no single prophylactic strategy is applicable to all procedures, and recommendations vary according to the type and complexity of surgery. A systematic review of international guidelines has similarly emphasized that recommendations for perioperative antibiotic prophylaxis in head and neck surgery should be tailored to wound classification and procedural characteristics rather than applied uniformly across all operations.[17] More recent evidence also suggests that cefazolin, ampicillin-sulbactam, and amoxicillin-clavulanate are among the most effective agents for clean-contaminated head and neck surgery, whereas extending prophylaxis beyond 24-48 h does not appear to provide additional protection against surgical site infection.[18]

Although adenoidectomy, tonsillectomy, and adenotonsillectomy are categorized as clean-contaminated procedures, current guidelines do not recommend routine antibiotic prophylaxis for these operations.[4,19,20] Nevertheless, prophylaxis administration during at least one perioperative period was reported for adenoidectomy (57.7%), pediatric tonsillectomy (67.5%), adult tonsillectomy (72.4%), and adenotonsillectomy (68.9%). These findings indicate that antibiotic prophylaxis continues to be widely used in these procedures despite current guideline recommendations against its routine use.

Septoplasty is generally considered a clean-contaminated procedure for which routine antibiotic prophylaxis is not recommended.[4,11,20] Furthermore, the use of nasal packing in uncomplicated septoplasty has not been associated with a significant increase in postoperative infection rates.[21,22] However, infection risk may differ in more complex procedures, including revision septorhinoplasty, graft-based nasal surgery, and septal defect repair.[23] A recent systematic review and meta-analysis found no substantial evidence that prophylactic antibiotics reduce postoperative infection rates in septoplasty, rhinoplasty, or septorhinoplasty, although the available studies were heterogeneous and included procedures of varying complexity.[24] In our study, antibiotic prophylaxis during at least one perioperative period was reported for closed septoplasty (77.4%), open septoplasty (84.6%), and septorhinoplasty (87.8%). These findings indicate that prophylaxis remains commonly used across nasal procedures despite the limited evidence supporting its routine use, particularly in uncomplicated cases.

Evidence regarding antibiotic prophylaxis in endoscopic sinus surgery varies according to the surgical indication and clinical context. Recent evidence does not support the routine use of postoperative antibiotics following uncomplicated endoscopic sinus surgery for chronic rhinosinusitis. A systematic review found no level 1 evidence that postoperative antibiotics improve patient-reported or endoscopic outcomes after sinus surgery, although the available evidence regarding postoperative infection remains limited and heterogeneous.[25] Similarly, a randomized, double-blind, placebo-controlled trial reported no significant advantage of amoxicillin-clavulanate over placebo in terms of sinonasal quality of life, endoscopic findings, or postoperative infection rates, while diarrhea was more frequent among patients receiving antibiotics.[26] In contrast, procedures performed for malignancy, active infection, or extensive reconstruction may involve different contamination risks and should be evaluated separately. In our study, prophylaxis during at least one perioperative period was reported by 81.7% of respondents for endoscopic sinus surgery, and 58.3% reported postoperative antibiotic use. These findings indicate that postoperative antibiotic administration remains common despite the limited evidence supporting its routine use after uncomplicated surgery for chronic rhinosinusitis.

Antibiotic prophylaxis is recommended for clean-contaminated head and neck oncologic procedures and surgeries requiring flap reconstruction.[4,10,11,20] However, the optimal antibiotic agent and duration, particularly in complex procedures involving free-flap reconstruction, remain subjects of debate. Current evidence generally supports perioperative prophylaxis for 24-48 h, whereas continuation beyond 48 h has not been shown to provide additional protection against surgical site infection and may increase antibiotic-related adverse effects.[18,27] Consistent with the indication for prophylaxis in these procedures, prophylaxis during at least one perioperative period was reported by 94.4% of respondents for clean-contaminated oncologic surgery and 91.6% for surgeries involving locoregional or free-flap reconstruction.

Regarding otologic surgeries, antibiotic prophylaxis is not recommended for ventilation tube insertion or tympanoplasty, whereas it is recommended for mastoidectomy performed for chronic otitis media.[11,20] Nevertheless, in our study, prophylaxis during at least one perioperative period was reported for ventilation tube insertion (52.5%) and tympanoplasty (80.2%). In contrast, prophylaxis rates were 85.7% for simple mastoidectomy and 87.3% for radical mastoidectomy, suggesting that antibiotic prophylaxis is more consistently used in more complex otologic procedures.

International guidelines for surgical antimicrobial prophylaxis recommend cefazolin as the first-line agent for clean-contaminated procedures due to its favorable tissue penetration, narrow antimicrobial spectrum, and reliable pharmacokinetic profile.[1,4,28] In our study, cefazolin was the most frequently selected antibiotic in both the preoperative (61.3%) and intraoperative (68.6%) periods. This finding is largely consistent with current international recommendations for surgical prophylaxis. In contrast, postoperative antibiotic preferences were more heterogeneous, with amoxicillin-clavulanate being the most frequently selected agent (37.5%). Broad-spectrum antibiotics were commonly preferred during the postoperative period. Current evidence recommends administration of prophylactic antibiotics within 60 minutes before surgical incision, additional intraoperative dosing when procedures are prolonged, and discontinuation within 24 h for most procedures, although prophylaxis may be continued for up to 48 h in selected complex clean-contaminated head and neck procedures.[4,11,12,18,20] Prolonged administration does not reduce surgical site infections and may instead contribute to antimicrobial resistance, adverse effects, and increased healthcare costs.[29] In our study, only 8.9% of participants who reported using postoperative prophylaxis limited its duration to 24 h. More than 90% reported continuing prophylaxis beyond 24 h, most commonly for 6-7 days (53.7%). The tendency toward prolonged prophylaxis and the frequent use of broad-spectrum antibiotics in the postoperative period suggest that the concepts of prophylaxis and treatment may become blurred in routine clinical practice.

In our study, antibiotic prophylaxis preferences differed significantly according to institution type, particularly in the preoperative and postoperative periods. Although cefazolin was the most frequently selected antibiotic across all institutions in the preoperative period, its use was less common in university hospitals and training and research hospitals, where alternative agents such as ceftriaxone, ampicillin-sulbactam, and amoxicillin-clavulanate were more frequently preferred. This pattern may be related to the more heterogeneous patient populations, greater procedural complexity, and diversity of clinical practices typically encountered in tertiary referral centers. However, since our survey assessed antibiotic prophylaxis preferences in general rather than for specific surgical procedures, definitive conclusions cannot be drawn regarding the reasons underlying these differences. Indeed, current guidelines recommend cefazolin plus metronidazole, cefuroxime plus metronidazole, or ampicillin-sulbactam for certain complex procedures, including head and neck oncologic surgery.[4] In contrast, the higher rates of cefazolin use observed in state and private hospitals may reflect a more standardized approach to surgical prophylaxis. During the intraoperative period, cefazolin remained the predominant agent across all institution types. In the postoperative period, the more frequent use of amoxicillin-clavulanate in university hospitals and training and research hospitals may indicate a preference for broader-spectrum coverage against potential surgical site infections.

When institution type and professional experience were considered together, differences in antibiotic preferences were observed only during the preoperative period. Similarly, analyses according to professional title and years of experience showed that antibiotic selection was more heterogeneous among resident physicians and less experienced clinicians, whereas cefazolin preference increased with greater experience and seniority. Previous studies have suggested that younger physicians may use antibiotics more liberally due to medicolegal concerns and limited clinical experience.[30] However, the pattern observed in our study may also be related to the greater proportion of residents and less experienced physicians working in university hospitals and training and research hospitals. Indeed, preoperative antibiotic preferences were found to be more heterogeneous in these institutions. Nevertheless, no significant differences in antibiotic preferences according to professional title or experience were observed during the intraoperative or postoperative periods.

Another important finding of our study was that the reported availability of a written antibiotic prophylaxis protocol was not significantly associated with antibiotic preferences or postoperative prophylaxis duration. This finding suggests that the reported availability of a written protocol alone may not ensure standardized practice. However, the content, implementation, accessibility, and adherence to these protocols were not assessed in the present study.

Approximately one-third of participants in our study reported continuing to use antibiotic prophylaxis despite believing that it does not reduce postoperative infection rates. Furthermore, no statistically significant association was observed between beliefs regarding the effectiveness of prophylaxis and self-reported prescribing behavior. These findings suggest that decisions regarding antibiotic prophylaxis are not based solely on scientific evidence or personal beliefs. Rather, factors such as established practice patterns, institutional routines, and particularly medicolegal concerns may play an important role in shaping prescribing behavior.

One of the most noteworthy findings of our study was that rates of antibiotic prophylaxis appeared to increase in parallel with the magnitude and complexity of the surgical procedure rather than according to surgical wound classification (clean *vs.* clean-contaminated). International guidelines for surgical antimicrobial prophylaxis primarily base recommendations on wound classification, the risk of contamination, and the presence of implants or prosthetic materials.[1,3,4] Nevertheless, our data demonstrated that prophylaxis rates approached 90% even for clean procedures such as thyroidectomy and parotidectomy. These findings suggest that antibiotic prophylaxis practices may be more closely associated with perceived surgical risk and procedural invasiveness than with surgical wound classification alone. Similar patterns have been reported in other surgical specialties, where antibiotic use has been shown to increase in major and complex procedures regardless of guideline recommendations.[31]

In our study, the use of prophylactic antibiotics exceeded current guideline recommendations across all surgical categories. However, this discordance does not appear to be unique to Türkiye. Previous surveys conducted in the United States, Australia, and New Zealand have also reported substantial variation in perioperative antibiotic practices and frequent antibiotic use despite limited evidence of clinical benefit.[32-35] An international survey of head and neck surgeons similarly demonstrated considerable heterogeneity in surgical site infection prevention practices, including antibiotic selection and duration.[36] Therefore, the high rates of postoperative and prolonged antibiotic use observed in our study should be interpreted as part of a broader international guideline-practice gap, although the predominance of 6-7-day postoperative regimens may indicate a particularly pronounced stewardship concern in Türkiye.

Our study has certain limitations that warrant consideration. First, the study was based on self-reported responses rather than direct observation of clinical practice; therefore, discrepancies may exist between reported behaviors and actual prophylaxis practices. Second, the survey link was distributed through professional communication networks using a snowball sampling–like strategy, which may have introduced selection bias and resulted in the overrepresentation of physicians with a particular interest in antibiotic prophylaxis. Third, given that participation was voluntary, the possibility of response bias cannot be excluded. Detailed information regarding surgical case mix, institutional patient profiles, local microbiological epidemiology, and antimicrobial stewardship practices was not collected, although these factors may influence prophylaxis decisions. In addition, antibiotic agent preferences were assessed separately for the preoperative, intraoperative, and postoperative periods but were not collected on a procedure-specific basis in order to limit questionnaire length and respondent burden. Therefore, it was not possible to determine which agents were preferred for individual surgical procedures or to assess the appropriateness of agent selection according to procedure type and contamination risk. Furthermore, demographic parameters such as age and sex were not recorded, which precluded the evaluation of prophylaxis preferences across demographic subgroups. Finally, although several subgroup analyses were performed, the study was not designed to evaluate independent predictors of antibiotic prophylaxis behavior through multivariable modeling. Consequently, the potential interrelationships and confounding effects among institution type, academic title, and professional experience could not be fully disentangled.

Despite these limitations, the inclusion of physicians from a wide range of healthcare settings and professional experience levels represents an important strength of the study, providing a contemporary and comprehensive overview of antibiotic prophylaxis practices in otorhinolaryngology across Türkiye. The participation of clinicians from different regions of the country and diverse healthcare institutions enhances the national relevance of the findings. Nevertheless, since a non-probability sampling strategy was employed, caution is warranted when generalizing the results to the entire population of otorhinolaryngologists practicing in Türkiye.

In conclusion, our findings indicate that self-reported antibiotic prophylaxis practices in otorhinolaryngology varied more closely with the invasiveness and complexity of surgical procedures than with surgical wound classification. Preoperative antibiotic selection differed according to professional seniority and institution type, whereas the reported availability of a written protocol was not significantly associated with antibiotic preferences or postoperative prophylaxis duration. The observed discordance between clinical beliefs and reported practice further suggests that factors beyond scientific evidence may contribute to decisions regarding antibiotic prophylaxis. However, these findings should be interpreted in light of the snowball sampling strategy, the unknown response rate, and the reliance on self-reported practices rather than direct observation of actual prescribing behavior. These findings suggest that the availability of clinical guidelines alone may be insufficient to achieve meaningful standardization of practice. Multidisciplinary antimicrobial stewardship programs, regular audit and feedback mechanisms, and targeted educational interventions may be necessary to improve adherence to evidence-based recommendations. In particular, reducing unnecessary or prolonged prophylaxis in clean and clean-contaminated procedures is critical for combating antimicrobial resistance.

Conflict of Interest: The author declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The author received no financial support for the research and/or authorship of this article.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

AI Disclosure: The author declare that artificial intelligence (AI) tools were not used, or were used solely for language editing, and had no role in data analysis, interpretation, or the formulation of conclusions. All scientific content, data interpretation, and conclusions are the sole responsibility of the author. The author further confirm that AI tools were not used to generate, fabricate, or 'hallucinate' references, and that all references have been carefully verified for accuracy.

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