

ENT Knowledge and Preventive Practices Among Undergraduate Students in Riyadh, Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

To assess knowledge of common ear, nose and throat (ENT) conditions and selected preventive practices among undergraduate students in Riyadh, and to identify factors associated with total knowledge scores. Cross-sectional questionnaire survey. Four universities in Riyadh, Saudi Arabia. A structured electronic questionnaire was completed by 405 undergraduates recruited by convenience sampling between September 2025 and January 2026. Seventeen knowledge items generated a 0–17 score; internal consistency was good (KR-20=0.87). Multivariable linear regression used heteroscedasticity-robust standard errors. Associations between total knowledge and three selected practices were assessed with Spearman correlation. The mean knowledge score was $9.84 \pm 4.41/17$. Poor, moderate and good predefined knowledge categories included 43.7%, 36.0% and 20.2% of participants, respectively. Cotton swabs were used at least sometimes by 76.8%, annual influenza vaccination was reported by 17.8%, and 60.2% selected the correct forward-leaning approach to epistaxis. In adjusted analysis, several demographic and clinical characteristics were associated with knowledge scores, although the model explained a modest proportion of score variance. Knowledge was not significantly associated with cotton-swab avoidance or influenza vaccination and was weakly associated with correct epistaxis management ($\rho=0.249$, $p<0.001$). Important gaps remain in ENT knowledge and selected preventive practices among university students. Educational interventions should focus on specific misconceptions and practical behaviours rather than information alone.

Keywords: Otorhinolaryngology; ENT; knowledge; preventive practices; university students; Saudi Arabia

INTRODUCTION

Ear, nose and throat (ENT) health is relevant to young adults because common conditions and preventable exposures can affect hearing, nasal symptoms, voice and upper-airway health. More than 1.5 billion people are estimated to have some degree of hearing loss, while allergic rhinitis affects approximately 400 million people worldwide^{1,2}. Unsafe listening through personal audio devices is common among adolescents and young adults, and urban air-pollution exposure has also been associated with upper respiratory tract infection in college students³⁻⁵.

Saudi studies have repeatedly identified gaps in ENT knowledge. A Riyadh community survey reported limited knowledge of common ENT conditions, while a multi-institutional study of 1,124 medical students from public universities in Riyadh examined basic ENT knowledge in relation to undergraduate education^{6,7}. Studies from Makkah, Najran and Abha have similarly reported misconceptions among students⁸⁻¹⁰. More recently, a Riyadh survey focused specifically on ear-health awareness and practices among university students¹¹. These studies differ in population and scope, and few have examined knowledge across all three ENT domains alongside selected preventive behaviours in a general undergraduate population drawn from more than one institution.

This study aimed to assess ENT knowledge and selected preventive practices among undergraduate students at four universities in

Riyadh and to identify participant characteristics associated with total knowledge scores.

METHOD

Design and setting: A cross-sectional questionnaire survey was conducted among undergraduate students in Riyadh, Saudi Arabia, from 23 September 2025 to 17 January 2026.

Participants and sampling: Students from Imam Mohammad Ibn Saud Islamic University (IMSIU), King Saud University (KSU), King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) and Princess Nourah bint Abdulrahman University (PNU) were recruited using non-probability convenience sampling. Trained student data collectors approached eligible students at the participating universities, and recruitment continued until 405 eligible responses were obtained.

Full-time undergraduate students in academic years one to four who provided electronic informed consent were eligible. Students outside the four participating universities, postgraduate students, graduates and individuals who declined consent were excluded.

Questionnaire: A structured electronic questionnaire collected sociodemographic information (academic year, gender, Riyadh residency, university and nationality), previous diagnoses of ear, nose or throat problems, previous ENT surgery, 17 knowledge items

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and three practice items. The knowledge section comprised four ear items, six nose items and seven throat items. Response options were Yes, No and I Don't Know. The practice questions addressed cotton-swab use for ear cleaning, influenza-vaccination frequency and head position during epistaxis. Content validity was reviewed by two ENT consultants and one community-medicine faculty member. A formal pilot study was not conducted.

Scoring: Each correct knowledge response was assigned one point; incorrect, I Don't Know and blank responses were assigned zero. Fourteen items were keyed Yes and three were keyed No (vitamin C cures influenza, long-term nasal decongestant use is safe, and tonsillectomy weakens immunity). Total scores ranged from 0 to 17. Predefined study categories were poor (0–10), moderate (11–13) and good (14–17), corresponding approximately to <60%, 60–79% and ≥80% of the maximum score. Internal consistency of the dichotomously scored knowledge scale was assessed with the Kuder-Richardson 20 coefficient (KR-20).

Statistical analysis: Analyses were performed in R. Categorical variables are presented as frequencies and percentages, and total knowledge scores as mean and standard deviation. Associations between predefined knowledge categories and selected participant characteristics were assessed using chi-square tests. A multivariable ordinary least-squares regression model was fitted with total knowledge score as the outcome and gender, academic year, university, nationality, Riyadh residency, previous ear, nose and throat diagnoses and ENT surgery history as covariates. Because residual variance was not constant, HC3 heteroscedasticity-robust standard errors and 95% confidence intervals were used. For practice analyses, safer behaviour was coded in an ordinal direction (cotton swabs: always=0, sometimes=1, never=2; influenza vaccination: never=0, sometimes=1, annually=2; epistaxis: backward=0, forward=1). Spearman rank correlation was used to examine associations between total knowledge and each practice separately. Statistical significance was set at $p < 0.05$.

Ethical considerations: The study protocol underwent full review and was accepted by the Institutional Review Board of Imam Mohammad Ibn Saud Islamic University (Session 81). Participation

was voluntary, electronic informed consent was obtained before questionnaire completion, and responses were de-identified and handled confidentially.

RESULT

A total of 405 eligible students were included. Participant characteristics are shown in Table 1. Third-year students represented 31.1% of the sample, 56.5% were male, 66.2% lived in Riyadh and 98.3% were Saudi nationals.

Knowledge

The mean total knowledge score was 9.84 ± 4.41 out of 17. The KR-20 coefficient was 0.87. Using the predefined score categories, 177 students (43.7%) were classified as poor, 146 (36.0%) as moderate and 82 (20.2%) as good. Mean percentage correct was 68.2% in the ear domain, 45.8% in the nose domain and 62.3% in the throat domain.

Item-level performance is shown in Table 2 and Figure 1. The highest correct-response rates were for shouting-related vocal-cord damage (75.8%), adequate water intake for throat health (75.6%) and the social effect of hearing loss (73.8%). The lowest were for vitamin C as a cure for influenza (15.6%), tonsillectomy and immunity (17.5%) and long-term nasal decongestant safety (33.6%).

Knowledge categories and participant characteristics

Knowledge category differed by academic year ($p = 0.011$) and by previous diagnoses of ear ($p = 0.006$), nose ($p = 0.005$) and throat problems ($p < 0.001$). Gender was not associated with the three-level knowledge category on bivariate analysis ($p = 0.328$). Selected bivariate results are shown in Table 3, and the distribution of total knowledge scores and categories is shown in Figure 2.

Preventive practices

Cotton swabs were used sometimes by 199 students (49.1%) and always by 112 (27.7%); 94 (23.2%) reported never using them. Annual influenza vaccination was reported by 72 students (17.8%), 170

Table 1. Participant characteristics (N=405)

Characteristic	Category	n (%)
Academic year	1st	77 (19.0)
	2nd	105 (25.9)
	3rd	126 (31.1)
	4th	97 (24.0)
Gender	Female	176 (43.5)
	Male	229 (56.5)
Riyadh resident	Yes	268 (66.2)
	No	137 (33.8)
University	IMSIU	175 (43.2)
	KSU	90 (22.2)
	KSAU-HS	73 (18.0)
	PNU	67 (16.5)
Nationality	Saudi	398 (98.3)
	Non-Saudi	7 (1.7)
Diagnosed ear problem	Yes	107 (26.4)
Diagnosed nose problem	Yes	90 (22.2)
Diagnosed throat problem	Yes	127 (31.4)
ENT surgery history	Yes	72 (17.8)

IMSIU: Imam Mohammad Ibn Saud Islamic University; KSU: King Saud University; KSAU-HS: King Saud bin Abdulaziz University for Health Sciences; PNU: Princess Nourah bint Abdulrahman University.

Table 2. Correct-response rate by knowledge item (N=405)

Domain	Knowledge item	Keyed answer	Correct, n (%)
Ear	Hearing loss affects social life	Yes	299 (73.8)
Ear	Loud noise can cause hearing loss	Yes	262 (64.7)
Ear	Ear infections may cause dizziness	Yes	276 (68.1)
Ear	Vertigo refers to a spinning sensation	Yes	268 (66.2)
Nose	Colds do not require antibiotics	Yes	204 (50.4)
Nose	Allergic rhinitis causes nasal congestion	Yes	257 (63.5)
Nose	Influenza vaccine advised in diabetes or hypertension	Yes	171 (42.2)
Nose	Vitamin C cures influenza	No	63 (15.6)
Nose	Long-term nasal decongestant use is safe	No	136 (33.6)
Nose	Strong odours can provoke nasal symptoms	Yes	283 (69.9)
Throat	Snoring may indicate sleep apnoea	Yes	226 (55.8)
Throat	Tonsillectomy weakens the immune system	No	71 (17.5)
Throat	Smoking harms the throat	Yes	294 (72.6)
Throat	Shouting can damage the vocal cords	Yes	307 (75.8)
Throat	Warm fluids may help sore throat symptoms	Yes	277 (68.4)
Throat	Avoiding very cold drinks during throat infection	Yes	285 (70.4)
Throat	Adequate water intake supports throat health	Yes	306 (75.6)

Incorrect, “I Don’t Know” and blank responses were scored 0. The influenza-vaccination item combined diabetes and hypertension and is discussed as an instrument limitation.

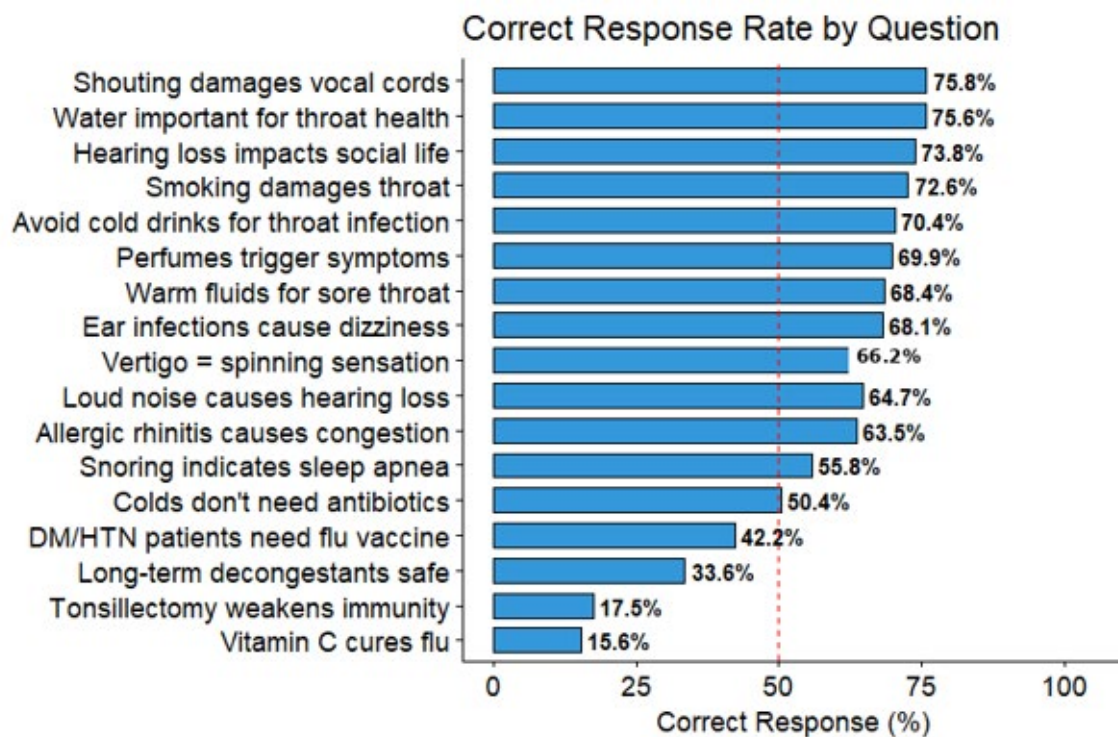


Figure 1. Correct response rate by knowledge item (N=405). Items are shown as the statements presented to participants. For vitamin C cures influenza, tonsillectomy weakens the immune system, and long-term nasal decongestant use is safe, the keyed correct response was ‘No’; therefore, the bars represent the proportion correctly rejecting these statements.

(42.0%) reported vaccination sometimes and 163 (40.2%) never. For epistaxis, 244 students (60.2%) selected the recommended forward-leaning position and 161 (39.8%) selected backward leaning (Figure 3).

Total knowledge was not significantly associated with cotton-swab avoidance ($\rho=-0.055$, $p=0.271$) or influenza-vaccination frequency ($\rho=0.075$, $p=0.131$). A weak positive association was found with correct epistaxis management ($\rho=0.249$, $p<0.001$). Practice distributions and correlations are summarised in Table 4.

Multivariable analysis

In the adjusted model, male gender was associated with a 1.05-point lower knowledge score (95% CI -1.97 to -0.12; $p=0.027$), and third-year enrolment with a 1.35-point lower score compared with first year (95% CI -2.64 to -0.06; $p=0.041$). Previous ear and throat diagnoses were independently associated with higher scores. Second- and fourth-year enrolment, university, nationality, Riyadh residency, previous nose diagnosis and ENT surgery history were not independently associated with total score. The model explained 13.6% of score variance (adjusted $R^2=10.7\%$; Table 5).

Table 3. Knowledge category by selected participant characteristics

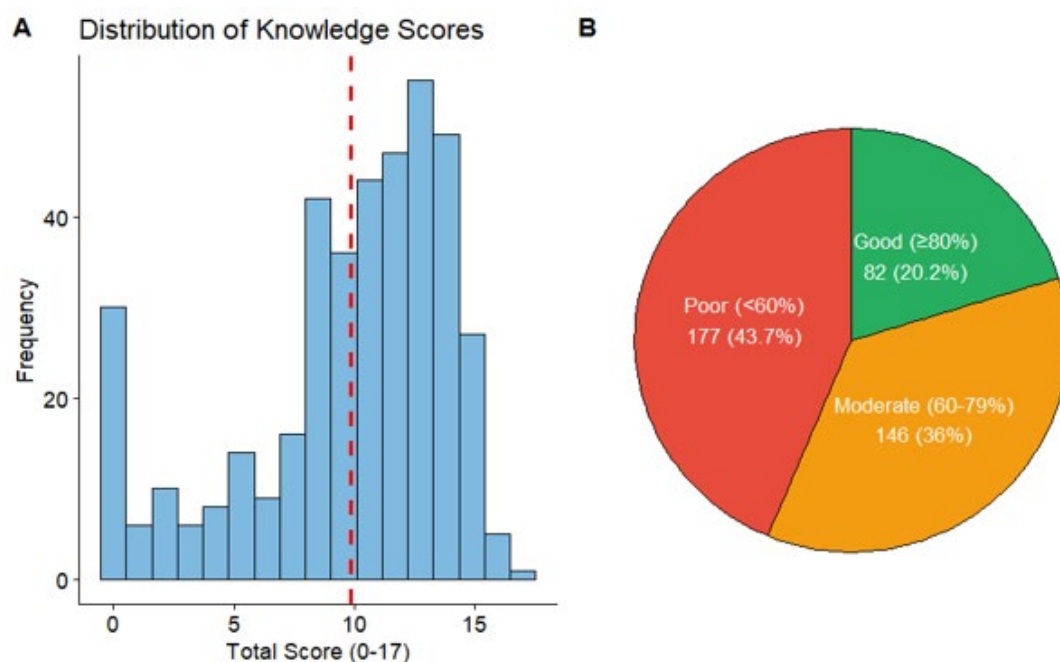
Characteristic	Group	Poor, n (%)	Moderate, n (%)	Good, n (%)	p
Gender	Female	70 (39.8)	66 (37.5)	40 (22.7)	0.328
	Male	107 (46.7)	80 (34.9)	42 (18.3)	
Academic year	1st	36 (46.8)	29 (37.7)	12 (15.6)	0.011
	2nd	44 (41.9)	41 (39.0)	20 (19.0)	
	3rd	67 (53.2)	40 (31.7)	19 (15.1)	
	4th	30 (30.9)	36 (37.1)	31 (32.0)	
Diagnosed ear problem	Yes	33 (30.8)	45 (42.1)	29 (27.1)	0.006
	No	144 (48.3)	101 (33.9)	53 (17.8)	
Diagnosed nose problem	Yes	26 (28.9)	39 (43.3)	25 (27.8)	0.005
	No	151 (47.9)	107 (34.0)	57 (18.1)	
Diagnosed throat problem	Yes	38 (29.9)	52 (40.9)	37 (29.1)	<0.001
	No	139 (50.0)	94 (33.8)	45 (16.2)	

Percentages are calculated within each participant group (row percentages). P-values are from chi-square tests. Poor=0–10; moderate=11–13; good=14–17.

Table 4. Selected preventive practices and association with total knowledge score

Practice	Response	n (%)	Overall Spearman rho	Overall p
Cotton swab use	Never	94 (23.2)	-0.055	0.271
	Sometimes	199 (49.1)		
	Always	112 (27.7)		
Influenza vaccination	Annually	72 (17.8)	0.075	0.131
	Sometimes	170 (42.0)		
	Never	163 (40.2)		
Epistaxis management	Lean forward	244 (60.2)	0.249	<0.001
	Lean backward	161 (39.8)		

For correlation analyses, higher practice values represented safer behaviour: cotton swabs always=0, sometimes=1, never=2; influenza vaccination never=0, sometimes=1, annually=2; epistaxis backward=0, forward=1.

**Figure 2.** Distribution of total ENT knowledge scores and predefined knowledge categories among undergraduate students (N=405).

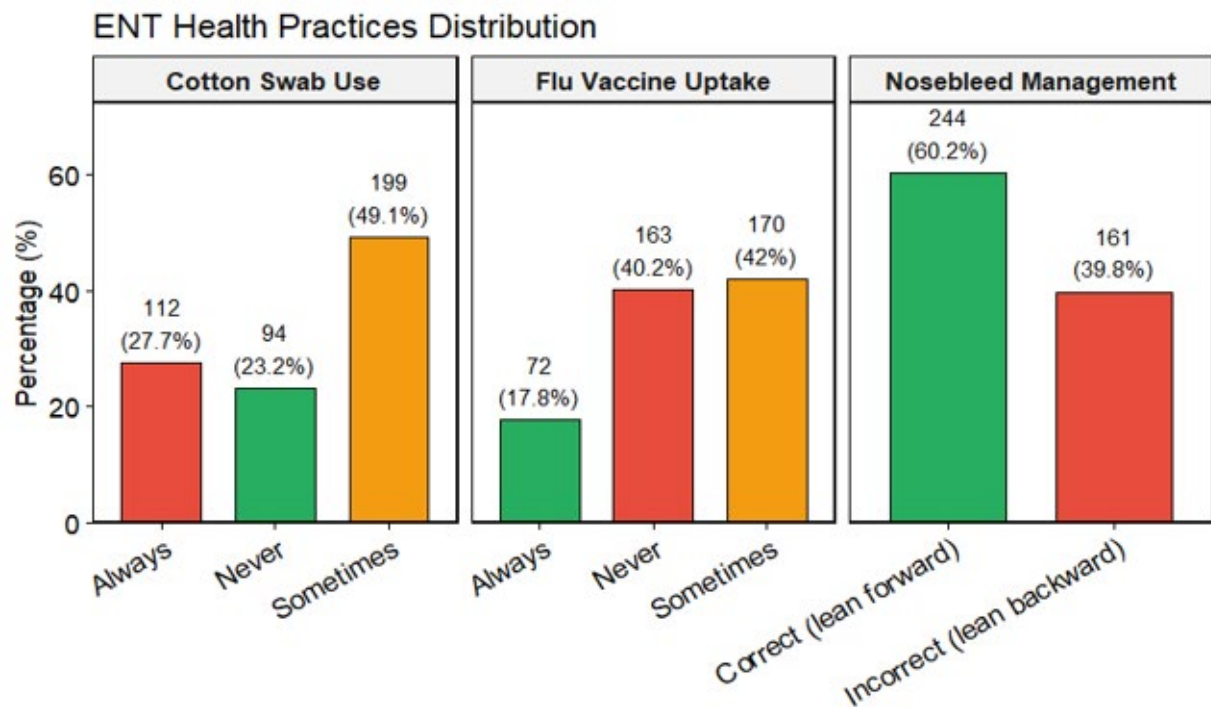


Figure 3. Distribution of selected ENT health practices among undergraduate students (N=405).

Table 5. Multivariable linear regression for total knowledge score

Predictor	B	Robust 95% CI	p
Intercept	10.98	8.23 to 13.74	<0.001
Male gender (vs female)	-1.05	-1.97 to -0.12	0.027
Second year (vs first year)	0.09	-1.07 to 1.24	0.882
Third year (vs first year)	-1.35	-2.64 to -0.06	0.041
Fourth year (vs first year)	0.85	-0.46 to 2.16	0.202
KSAU-HS (vs IMSIU)	-0.35	-1.66 to 0.95	0.592
KSU (vs IMSIU)	-0.37	-1.44 to 0.71	0.502
PNU (vs IMSIU)	-0.99	-2.32 to 0.34	0.143
Saudi (vs non-Saudi)	-1.18	-3.63 to 1.27	0.344
Riyadh resident (vs no)	0.37	-0.62 to 1.36	0.466
Diagnosed ear problem (yes vs no)	1.40	0.54 to 2.26	0.001
Diagnosed nose problem (yes vs no)	0.76	-0.18 to 1.69	0.113
Diagnosed throat problem (yes vs no)	1.18	0.32 to 2.04	0.007
ENT surgery history (yes vs no)	-0.22	-1.26 to 0.82	0.676

HC3 heteroscedasticity-robust standard errors were used. $R^2=0.136$; adjusted $R^2=0.107$. Reference categories are shown in parentheses.

DISCUSSION

This multi-university survey found substantial gaps in ENT knowledge and selected preventive practices. Only one in five students fell within the good knowledge category, more than three-quarters used cotton swabs at least sometimes, and fewer than one in five reported annual influenza vaccination. Knowledge was weakest in the nose domain, particularly for vitamin C and long-term decongestant safety.

The overall pattern is consistent with previous Saudi research, although direct percentage comparisons should be made cautiously because populations, questionnaires and scoring systems differ. Studies in Riyadh, Makkah, Najran and Abha have all reported misconceptions or incomplete ENT knowledge, while a recent Riyadh study focusing on ear health also identified potentially unsafe ear-care practices⁶⁻¹¹. Compared with earlier Riyadh work, which has focused either on medical students or on ear health alone, the present study examines

undergraduates across four universities and covers all three ENT domains together with three selected preventive behaviours. Its contribution is therefore one of scope rather than sample size.

Several knowledge gaps have straightforward clinical relevance. Half of the sample did not recognise that routine colds do not require antibiotics, two-thirds did not identify long-term nasal decongestant use as unsafe, and misconceptions about tonsillectomy and immunity were common. These findings support focused education on a limited number of practical messages rather than broad information campaigns.

The relationship between knowledge and behaviour was limited. Higher knowledge scores were not associated with less cotton-swab use or more frequent influenza vaccination, and the association with correct epistaxis management was weak. This is compatible with the Health Belief Model, in which behaviour depends on perceived risk, barriers and practical feasibility in addition to knowledge¹². These

constructs were not measured in this study, so the model is used only as an interpretive framework.

Male gender and third-year enrolment were associated with lower adjusted knowledge scores, whereas previous ear and throat diagnoses were associated with higher scores. These associations should be interpreted cautiously. The cross-sectional design cannot explain why the differences occurred, and the regression model accounted for only a modest proportion of score variance. The third-year finding in particular should be regarded as exploratory rather than evidence of a curricular effect.

This study has limitations. Convenience sampling restricts generalisability, and all practices were self-reported. The practice component contained only three items and was not intended as a comprehensive behaviour scale. The knowledge categories were predefined for this study rather than externally validated. The questionnaire was not formally piloted, and some items reflected commonly given preventive advice rather than formal guideline endpoints, including advice concerning cold drinks during throat infection. One influenza-vaccination item combined diabetes and hypertension, conditions that do not have identical guideline indications; this should be separated in future instruments. The nationality estimate should also be interpreted cautiously because only seven participants were non-Saudi. Finally, the multivariable model explained only 10.7% of adjusted variance, indicating that important determinants of knowledge were not measured.

Despite these limitations, the study identifies specific and potentially modifiable misconceptions in a sizeable undergraduate sample. Campus education should prioritise practical messages on safe ear cleaning, appropriate antibiotic and decongestant use, influenza vaccination and first-aid management of epistaxis, with future work assessing whether such interventions change behaviour as well as knowledge.

CONCLUSION

ENT knowledge and selected preventive practices were suboptimal among undergraduate students at four universities in Riyadh. One in five students reached the good knowledge category, cotton-swab use was common and annual influenza vaccination was uncommon. Knowledge alone showed little relationship with safer behaviour, apart from a weak association with correct epistaxis management. Targeted, practical campus interventions addressing the specific misconceptions identified in this study are warranted, and future studies should use validated behavioural measures and evaluate changes in practice over time.

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Competing Interest: None

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