



A nationwide survey of otolaryngologists' compliance with Chinese guidelines for diagnosis and treatment of allergic rhinitis

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ABSTRACT

Background: A higher compliance with clinical guidelines helps improve treatment outcomes. But the clinical practice of otolaryngologists is not always consistent with guidelines.

Objective: To describe otolaryngologists' compliance with guidelines about allergic rhinitis (AR) management and identify factors responsible for the discordance between clinical practice and guideline recommendations in China.

Methods: A cross-sectional nationwide survey was designed and conducted via an online platform. Recruitment was done by emailing otolaryngologists registered in the Chinese Society of Otorhinolaryngology-Head and Neck Surgery or by inviting otolaryngologists to scan a Quick Respond (QR) code that linked to the questionnaire at various academic meetings.

Results: A total of 2142 otolaryngologists were eligible and completed the survey. Of them, 64.7% had over 10 years work experience and 97.4% had a bachelor's degree or higher. About 18.3% of the participants strictly copied the guideline in clinical practice, while 73.7% used the guideline that had been adjusted according to their clinical experience. Otolaryngologists were most concerned about the efficacy, safety, and minimum age of AR medications, and least concerned about patient preferences. Regarding the use of intranasal steroids (INS), leukotriene receptor antagonists (LTRA), and H1-antihistamines, 86.8%, 55.7% and 51.2% of otolaryngologists complied with the guideline recommendations, respectively. Educational background was a factor affecting the compliance with guidelines and acceptance of INS.

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Conclusion: A vast majority of Chinese otolaryngologists complied with the current Chinese AR guidelines. A difference still existed between the otolaryngologists' real-world and guideline-recommended management. The otolaryngologists should pay more attention to patient preferences. A higher education could improve otolaryngologists' adherence to the guidelines.

Keywords: Allergic rhinitis, Otolaryngologists, Clinical practice guidelines, Adherence, Perception, Survey

INTRODUCTION

Allergic rhinitis (AR) is one of the allergic diseases with an increasing global prevalence.¹ In northern China, the self-reported AR prevalence, according to a population-based study conducted in 2008, was 19.1% in the rural area and 13.5% in the urban area, with notable geographical variations.² AR is not life-threatening, but enough to decrease patients' quality of life.³

Clinical practice guidelines (CPGs) play an essential role in the management of AR. Bousquet et al⁴ demonstrated in a clinical trial that treatments complying with Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines brought better outcomes than the non-standardized treatments. Therefore, physicians' compliance with guidelines should be a prerequisite for successful AR treatment.^{5,6}

The AR guideline was first released in China in 1991, and last updated in 2015 through incorporating both national and international progress in AR research and clinical management.⁷ Compared with 2009 Chinese guidelines for diagnosis and treatment of AR, the 2015 version is more concentrated on the characteristics of AR, its impact on health and quality of life, and standards of diagnosis and treatment. Moreover, patient education was also first written into 2015 AR guidelines.⁸

A few studies have recognized the issue that CPGs may not be well adhered to in clinical practice. Studies conducted in other countries, such as Mexico, South Korea, and the Philippines, have found that physicians hold divergent opinions on CPGs and refuse some recommendations in their own treatments.⁹⁻¹² In China, Su et al¹³ conducted a cross-sectional survey to assess the compliance

of physicians with the Global Initiative for Asthma (GINA) and ARIA guidelines during the management of asthma-AR patients. They identified differences between physicians' concepts about AR and asthma-AR comorbidities. One national study conducted among otolaryngologists in China found that allergen immunotherapy for AR should be more standardized.¹⁴ However, still lacking studies have been conducted in China for assessing otolaryngologists' adherence to AR guidelines.

This study aimed to investigate the differences between guideline recommendations and clinical practice of AR among Chinese otolaryngologists. Factors associated with these differences were analyzed. Our findings can provide new evidence for improving the CPGs.

METHODS

Survey design and administration

This was a nationwide questionnaire-based investigation initiated by the Rhinology Group of the Chinese Society of Otorhinolaryngology-Head and Neck Surgery. Eligible were those registered otolaryngologists willing to participate in this study. Written informed consent was obtained from all participants. Survey distribution started in December 2017 and ended in May 2018. All data were obtained by self-report and voluntary participation. The study was a cross-sectional survey, in which questionnaires were disseminated to otolaryngologists from 30 regions (provinces, municipalities, and autonomous regions) in mainland China, and Hong Kong and Macau special administrative regions via both online and offline channels. The online channel was emailing the survey to members registered in the Chinese Society of Otorhinolaryngology-Head and Neck

Surgery; the offline channel was inviting the otolaryngologists to participate in the survey through scanning a QR code at various spots (eg, academic conferences and CME lectures). The ethics committee of the principal investigator's university hospital (the First Affiliated Hospital of Nanjing Medical University) has reviewed the research protocol and provided with consent for publication of the data (Approval No. 2021-QT-05).

Questionnaire

The questionnaire (see Appendix) was designed and evaluated by experts of the Chinese Society of Otorhinolaryngology-Head and Neck Surgery, which mainly including 1) Socio-demographic characteristics; 2) Acceptance of the 2015 Chinese AR guidelines; 3) Opinions and clinical practice on AR diagnosis; 4) Opinions and clinical practice on AR treatment; and 5) Opinions on assessment methods of treatment effectiveness.

Statistical analysis

Continuous variables were presented using mean and standard deviation (SD) while categorical variables as counts and percentages. Chi-square test or Fisher's exact test was used to determine the differences in clinical practice or opinions between groups of otolaryngologists with different characteristics.

According to the previous epidemiological surveys of AR in mainland China,^{15,16} the study participants were divided into two groups. The first group of participants ($n = 1787$) were from regions covered in previous surveys (Jiangsu, Shandong, Zhejiang, Heilongjiang, Fujian, Hubei, Shaanxi, Guangdong, Jilin, Sichuan, Xinjiang, Chongqing, Beijing, Liaoning, Tianjin, Henan, Yunnan, Shanghai, Inner Mongolia, Hunan, Ningxia, and Hainan), while the second group of participants ($n = 355$) were from the regions not covered in previous surveys (Shanxi, Gansu, Jiangxi, Hebei, Guangxi, Guizhou, Anhui, Qinghai, Hong Kong, and Macao).

All hypothesis tests were carried out at the 5% (2-sided) significance level unless otherwise specified. *P*-values were rounded to 3 decimal places. *P*-values less than 0.001 were reported as <0.001 in the tables. Statistical analyses were performed

using Stata SE version 14.0 (StataCorp LLC, Texas, USA).

RESULTS

Demographical data

A total of 2142 otolaryngologists from 30 regions completed the survey, with a mean (SD) age of 39.6 (7.8) years. Around 64.7% had worked as otolaryngologists for over 10 years and 97.4% had a bachelor's degree or higher (Table 1).

Compliance of otolaryngologists

In terms of attitude towards guidelines, 73.7% (1579) of the otolaryngologists reported that they complied with guideline recommendations, but adjusted them according to their own clinical experience, while only 18.3% (392) strictly followed the guideline recommendations, with non-change in practice. Besides, 7.6% (162) of the otolaryngologists preferred to practice based on experts' or their own clinical experience, and the rest 0.4% (9) reported that the guideline had no influence on their clinical practice. They also had different opinions on AR treatment (Table 2).

Otolaryngologists with higher education preferred to fully comply with the guidelines ($P < 0.001$, Table 3). Region (whether covered in previous AR surveys) was not found associated with otolaryngologists' attitude to the guidelines ($P = 0.551$, Table 4).

AR diagnosis

As to AR diagnostic criteria, the top 3 most preferred by otolaryngologists were patients' nasal symptoms, nasal examinations, and eye symptoms (mean = 8.2, 7.3 and 5.9, respectively) (Fig. 1).

AR treatment

The 3 dimensions in AR treatment that otolaryngologists cared about most were drug efficacy, drug safety, and minimum age for medications (mean = 8.5, 8.2 and 8.2, respectively). Patient preference was the least concerned by otolaryngologists (mean = 4.9) (Fig. 2).

Regarding the use of intranasal steroids (INS), 86.8% (1859) of the otolaryngologists were compliant with the guideline in that they "often or

Items	Respondents (%)
Gender	
Male	1340 (62.6)
Female	802 (37.4)
Ethnicity	
Han Chinese	2002 (93.5)
Other	140 (6.5)
Hospital	
ENT professional	89 (4.2)
Teaching	484 (22.6)
Tertiary, class-A	1120 (52.3)
Tertiary, class-B	227 (10.6)
Secondary, class-A	536 (25.0)
Secondary, class-B	51 (2.4)
Primary	12 (0.6)
Private	31 (1.4)
Years of working	
< 5 years	307 (14.3)
5-10 years	449 (21.0)
11-15 years	408 (19.0)
16-20 years	319 (14.9)
> 20 years	659 (30.8)
Highest education	
College degree	56 (2.6)
Bachelor's degree	1144 (53.4)
Master's degree	659 (30.8)
Doctoral degree	283 (13.2)
Number of AR patients during half day of outpatient service	
1-5	850 (39.7)
6-10	738 (34.5)
11-15	283 (13.2)
16-20	140 (6.5)

(continued)

always recommend treatment for no less than 2 weeks and at least 4 weeks for moderate to severe AR to control chronic inflammation of the nasal mucosa" (Table 2). Otolaryngologists with higher education tended to agree more with this recommendation of INS use ($P < 0.001$, Table 3). Otolaryngologists from regions covered in previous national AR surveys were also more adherent to this recommendation ($P = 0.001$, Table 4).

For leukotriene receptor antagonists (LTRA), 55.7% (1192) of the otolaryngologists complied with the guideline recommendation of listing LTRA as first-line therapy (Table 2). And this compliance was not associated with educational background ($P = 0.849$, Table 3) or region ($P = 0.317$, Table 4).

Regarding H1-antihistamine use, 51.2% (1097) of otolaryngologists agreed with the guideline that LTRA is more effective than antihistamines in relieving nasal congestion (Table 2). This compliance was not associated with educational background ($P = 0.252$, Table 3) and region ($P = 0.499$, Table 4).

As to nasal irrigation, 42.4% (908) of the otolaryngologists agreed with the guideline that nasal irrigation should be considered as adjunctive treatment (Table 2). This compliance was not associated with educational background ($P = 0.235$, Table 3) and region ($P = 0.446$, Table 4).

Around 33.2% (711) of otolaryngologists observed the guideline that Traditional Chinese Medicine (TCM) could be applied to long-term, consistent AR patients. Around 32.5% (696) otolaryngologists thought TCM could be applied to

Items	Respondents (%)
> 20	131 (6.1)
Whether from regions covered in previous national AR surveys	
Yes	1787 (83.4)
No	355 (16.6)

Table 1. (Continued) Characteristics of otolaryngologists in the survey (n = 2142) AR: allergic rhinitis; ENT: ear, nose, and throat.

Items	Respondents (%)
INS	
1. I often or always recommend treatment for no less than 2 weeks, and at least 4 weeks for moderate to severe AR to control chronic inflammation of the nasal mucosa	1859 (86.8)
2. I often or always recommend treatment less than 2 weeks, and patient should stop using when the symptoms are controlled	561 (26.2)
3. I often or always recommend prophylactic use of 1-2 weeks prior to the pollen season to reduce the overall dosage during pollen season	1457 (68.0)
4. I often or always recommended patients according to the nose and eye symptoms, on-demand medication	1489 (69.5)
LTRA	
1. I agree with the Chinese guideline for listing LTRA as first-line therapy	1192 (55.7)
2. Depends on the patient	657 (30.7)
3. No, I disagree	132 (6.2)
4. I don't know LTRA well	161 (7.5)
H1-antihistamines	
1. I agree that LTRA is more effective than antihistamines in relieving nasal congestion	1097 (51.2)
2. I do not agree that LTRA is more effective than antihistamines in relieving nasal congestion	266 (12.4)
3. Not sure. I need more clinical research evidence and patient feedback to justify	779 (36.4)
Nasal irrigation	
1. Should be listed as the first-line treatment	464 (21.7)
2. Should be considered as adjunctive treatment	908 (42.4)
3. Should be considered as the first-line treatment for the elderly, children and pregnant patients	602 (28.1)
4. It doesn't work well in AR patients.	168 (7.8)
TCM	
1. They won't be effective in short-term application, so we usually won't consider it	472 (22.0)
2. Not familiar with herb extraction, purification process, and safety, and there is a lack of evidence-based medicine, so recommendations are usually not considered	672 (31.4)
3. Could be applied to mild AR patients	696 (32.5)
4. Could be applied as adjunctive treatment to moderate to severe AR patients	634 (29.6)
5. Could be applied to treat long-term, consistent AR patients	711 (33.2)
Allergen immunotherapy	
1. Recommend patients combined with other allergic diseases to use immunotherapy	1076 (50.2)

(continued)

Items	Respondents (%)
2. Recommend children aged over 5 years to use immunotherapy	772 (36.0)
3. Recommend patients in need to use immunotherapy	1394 (65.1)
4. Recommend patients in good economic condition to use immunotherapy	848 (39.6)
Surgery	
1. When long-term, standardized medication treatment and immunotherapy fail, we will consider surgery	832 (38.8)
2. The long-term efficacy of surgery is not clear, so we usually won't suggest. We will be cautious when suggesting	906 (42.3)
3. Could be suggested in mild AR patients	53 (2.5)
4. Could be suggested in moderate to severe AR patients	155 (7.2)
5. Never recommend surgery since allergy could not be cured by surgery	196 (9.2)

Table 2. (Continued) Otolaryngologists' opinions on allergic rhinitis treatment (n = 2142) AR: allergic rhinitis; INS: intranasal steroids; LTRA: leukotriene receptor antagonists; TCM: Traditional Chinese Medicine.

mild AR patients, and 31.4% (672) responded with "Not familiar with herb extraction, purification process, and safety, and there is a lack of evidence-based medicine, so recommendations are usually not considered" (Table 2). Otolaryngologists with higher education tended to comply with the guideline that "TCM could be applied to long-term, consistent AR patients" ($P < 0.001$, Table 3). Region was not associated with this compliance ($P = 0.447$, Table 4).

Regarding the use of allergen immunotherapy, the majority of otolaryngologists (65.1%, n = 1394) were compliant with the guideline that immunotherapy should be recommended to patients who has a request for or a high acceptancy towards this therapy (Table 2). Otolaryngologists with higher education were more compliant with the guideline on immunotherapy use ($P < 0.001$, Table 3). Region was not associated with this compliance ($P = 0.142$, Table 4).

Also, 42.3% (906) of otolaryngologists were compliant with the guideline that the long-term effectiveness of surgery was not clear, therefore usually would not suggest using surgery for AR treatment (Table 2). Physicians with different educational background also showed different compliance with the use of surgery ($P = 0.013$, Table 3). Otolaryngologists from regions covered in previous national AR survey tended to comply with the recommendation of surgery ($P = 0.013$, Table 4).

AR assessment

The guideline recommended the medication score for assessing medication, 53.5% (1146) of otolaryngologists had heard of the medication score but seldom applied this strategy, 32.0% (686) did not know about this strategy, only 14.5% (310) knew and practiced this strategy. Educational background ($P = 0.237$, Table 3) and region were not associated with otolaryngologists' compliance with medication score ($P = 0.445$, Table 4).

DISCUSSION

Considering its geographical coverage and sample size, this is the largest survey on the compliance of otolaryngologists with AR guidelines ever conducted in China. The participants were from 30 regions, accounting for 97% (30/31) of the administrative regions in mainland China. Besides, we enrolled 5% of the 42 100 registered Chinese otolaryngologists, according to the 2019 China Health and Family Planning Statistics Yearbook.¹⁷ In this nationwide survey, the percentages of licensed otolaryngologists in eastern, central, and western China were 41%, 28%, and 30%, respectively. This distribution is similar to that in the total doctors in 3 areas of mainland China.

The Rhinology Group of the Chinese Society of Otorhinolaryngology-Head and Neck Surgery has published several versions of AR guidelines, each with updates in AR research at home and

Items	Total (%)	College degree (%)	Bachelor's degree (%)	Master's degree (%)	Doctoral degree (%)	P value
Whether fully follow guideline to diagnose and treat patients						
Yes	392 (18.3)	3 (5.4)	189 (16.5)	126 (19.1)	74 (26.2)	<0.001
No	1750 (81.7)	53 (94.6)	955 (83.5)	533 (80.9)	209 (73.8)	
Whether "often or always" recommend INS for no less than 2 weeks and at least 4 weeks for moderate to severe AR to control chronic inflammation of the nasal mucosa as recommended in guideline						
Yes	1859 (86.8)	40 (71.4)	982 (85.8)	579 (87.9)	258 (91.2)	<0.001
No	283 (13.2)	16 (28.6)	162 (14.2)	80 (12.1)	25 (8.8)	
Whether agree with the guideline in listing LTRA as first-line treatment						
Yes	1192 (55.7)	34 (60.7)	630 (55.1)	369 (56.0)	159 (56.2)	0.849
No or not sure	950 (44.3)	22 (39.3)	514 (44.9)	290 (44.0)	124 (43.8)	
Whether agree with guideline that LTRA is more effective than antihistamine in relieving nasal congestion						
Yes	1097 (51.2)	29 (51.8)	602 (52.6)	316 (48.0)	150 (53.0)	0.252
No or not sure	1045 (48.8)	27 (48.2)	542 (47.4)	343 (52.0)	133 (47.0)	
Whether think that nasal irrigation should be considered as adjunctive treatment as recommended in guideline						
Yes	908 (42.4)	18 (32.1)	480 (42.0)	279 (42.3)	131 (46.3)	0.235
No	1234 (57.6)	38 (67.9)	664 (58.0)	380 (57.7)	152 (53.7)	
Whether think that TCM could be applied to long-term, consistent AR patients as recommended in guideline						
Yes	711 (33.2)	28 (50.0)	415 (36.3)	197 (29.9)	71 (25.1)	<0.001
No	1431 (66.8)	28 (50.0)	729 (63.7)	462 (70.1)	212 (74.9)	

(continued)

Items	Total (%)	College degree (%)	Bachelor's degree (%)	Master's degree (%)	Doctoral degree (%)	P value
Whether recommend allergen immunotherapy to patients who request for immunotherapy as listed in guideline						
Yes	1394 (65.1)	29 (51.8)	709 (62.0)	459 (69.6)	197 (69.6)	<0.001
No	748 (34.9)	27 (48.2)	435 (38.0)	200 (30.4)	86 (30.4)	
Whether think that the long-term effectiveness of surgery was not clear, therefore usually would not suggest using surgery for AR treatment						
Yes	906 (42.3)	12 (21.4)	489 (42.7)	288 (43.7)	117 (41.3)	0.013
No	1236 (57.7)	44 (78.6)	655 (57.3)	371 (56.3)	166 (58.7)	
Whether use medication score for drug evaluation as recommended in guideline						
Yes	310 (14.5)	9 (16.1)	158 (13.8)	91 (13.8)	52 (18.4)	0.237
No	1832 (85.5)	47 (83.9)	986 (86.2)	568 (86.2)	231 (81.6)	

Table 3. (Continued) Otolaryngologists' opinions on guideline recommendations among all otolaryngologists with different education background (n = 2142) AR: allergic rhinitis; INS: intranasal steroids; LTRA: leukotriene receptor antagonists; TCM: Traditional Chinese Medicine.

abroad.^{8,18} Understanding and complying with AR guidelines are essential for physicians to carry out successful treatment.¹⁹ According to the Asia-Pacific Survey of Physicians on Asthma and Allergic Rhinitis (ASPAIR), the surveyed physicians showed overall consistency with GINA and ARIA guidelines, but also difference in their own theoretical understanding and clinical practice.²⁰ A systematic review identified 7 reasons why some physicians did not follow the guidelines, including unawareness of available guidelines, unfamiliarity with guidelines, lack of agreement with guidelines, lack of auto-effectiveness, lack of expectations for success, and lack of motivation and habits of consolidation in clinical practice.²¹

As shown, only a small number of otolaryngologists strictly copied the guideline recommendations, and the large majority complied with the guidelines, but also make adjustments depending on their clinical experience. This indicated that the AR clinical guideline was generally observed by Chinese otolaryngologists. This finding is

consistent with those from other countries. A survey conducted in 2018 evaluated 601 American otolaryngologists' views on the Allergic Rhinitis Clinical Practice Guideline (ARCPG) published in 2015.¹⁹ It showed that the large majority of physicians perceived ARCPG as correct and would follow it in practice. A survey performed among Dutch otolaryngologists showed that when guidelines did not provide strict recommendations and allowed flexibility to treatment, larger variations in treatment strategies occurred.²² Therefore, it is essential for guidelines to provide strict and clear recommendations to guide physicians' clinical practice. We also found that physicians with higher education were more likely to comply with the guideline strictly. Hence, the guidelines should be interpreted with more training programs to improve physicians' appreciation and adherence to the guidelines. A higher adherence of physicians can better disease control.¹⁹

Items	Total (%)	From regions covered in previous national AR surveys (%)	From other regions not covered in previous national AR surveys (%)	P value
Whether fully follow guideline to diagnose and treat patients				
Yes	392 (18.3)	331 (18.5)	61 (17.2)	0.551
No	1750 (81.7)	1456 (81.5)	294 (82.8)	
Whether "often or always" recommend INS for no less than 2 weeks and at least 4 weeks for moderate to severe AR to control chronic inflammation of the nasal mucosa as recommended in guideline				
Yes	1859 (86.8)	1571 (87.9)	288 (81.1)	0.001
No	283 (13.2)	216 (12.1)	67 (18.9)	
Whether agree with the guideline in listing LTRA as first-line treatment				
Yes	1192 (55.7)	1003 (56.1)	189 (53.2)	0.317
No or not sure	950 (44.3)	784 (43.9)	166 (46.8)	
Whether agree with guideline that LTRA is more effective than antihistamine in relieving nasal congestion				
Yes	1097 (51.2)	921 (51.5)	176 (49.6)	0.499
No or not sure	1045 (48.8)	866 (48.5)	179 (50.4)	
Whether think that nasal irrigation should				

(continued)

Items	Total (%)	From regions covered in previous national AR surveys (%)	From other regions not covered in previous national AR surveys (%)	P value
be considered as adjunctive treatment as recommended in guideline				
Yes	908 (42.4)	764 (42.8)	144 (40.6)	0.446
No	1234 (57.6)	1023 (57.3)	211 (59.4)	
Whether think that TCM could be applied to long-term, consistent AR patients as recommended in guideline				
Yes	711 (33.2)	587 (32.9)	124 (34.9)	0.447
No	1431 (66.8)	1200 (67.2)	231 (65.1)	
Whether recommend allergen immunotherapy to patients who request for immunotherapy as listed in guideline				
Yes	1394 (65.1)	1175 (65.8)	219 (61.7)	0.142
No	748 (34.9)	612 (34.3)	136 (38.3)	
Whether think that the long-term effectiveness of surgery was not clear, therefore usually would not suggest using surgery for AR treatment				
Yes	906 (42.3)	777 (43.5)	129 (36.3)	0.013
No	1236 (57.7)	1010 (56.5)	226 (63.7)	

(continued)

Items	Total (%)	From regions covered in previous national AR surveys (%)	From other regions not covered in previous national AR surveys (%)	P value
Whether use medication score for drug evaluation as recommended in guideline				
Yes	310 (14.5)	254 (14.2)	56 (15.8)	0.445
No	1832 (85.5)	1533 (85.8)	299 (84.2)	

Table 4. (Continued) Otolaryngologists’ opinions on guideline recommendations among all otolaryngologists from different regions (n = 2142) AR: allergic rhinitis; INS: intranasal steroids; LTRA: leukotriene receptor antagonists; TCM: Traditional Chinese Medicine.

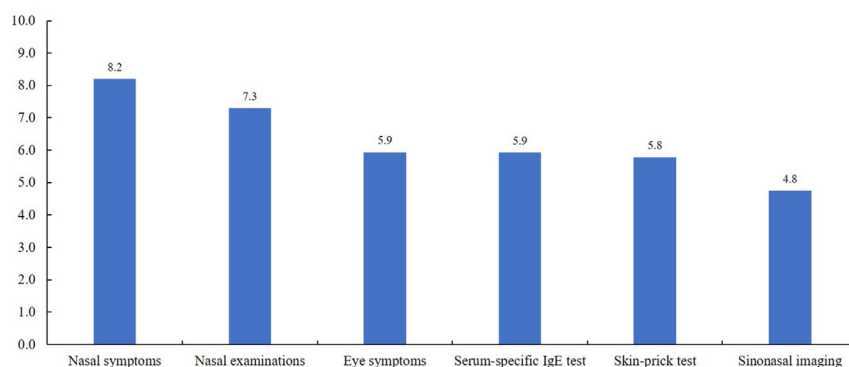


Fig. 1 Mean frequency score of how often the six diagnostic criteria for allergic rhinitis were applied by otolaryngologists. The score range for each diagnostic criterion was 0-10: 0 = I never diagnose allergic rhinitis based on this; 10 = I always diagnose allergic rhinitis based on this

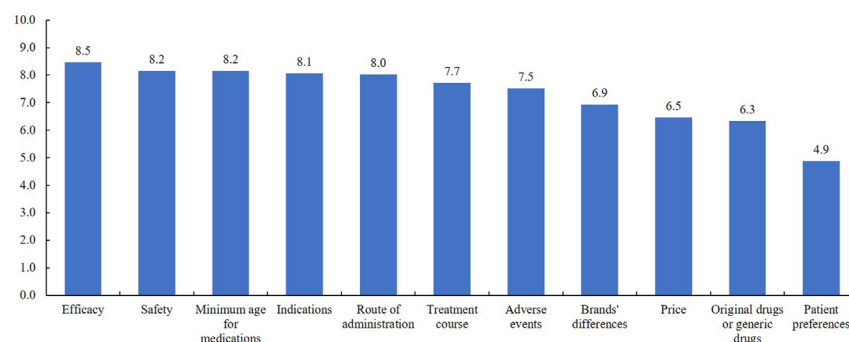


Fig. 2 Mean attention score of otolaryngologists to each of the 11 dimensions for allergic rhinitis treatment. The score range for each dimension was 0-10: 0 represents “I pay no attention to this item”; 10 represents “I pay great attention to this item”

This study showed that when diagnosing AR, Chinese otolaryngologists mainly depend on nasal symptoms, nasal examinations, and eye symptoms, followed by serum IgE tests and skin prick test (SPT). Nasal imaging is least used. SPT and the allergen-specific IgE test were two most used tools

for AR diagnosis. With high sensitivity and specificity, SPT can detect IgE-mediated type I hypersensitivity, thus providing valuable evidence for the diagnosis of AR.⁸ That SPT or IgE test are not widely used by Chinese physicians in clinical setting may be due to their limited access to

reagents, or their poor awareness on the usefulness of tests.

Similarly, an ISMAR international survey showed that 97.1% of physicians diagnosed AR based on clinical history, without carrying out allergy testing in less than half patients.²³ A survey in the United States showed that 29.6% of physicians diagnosed AR based on medical history and physical examination findings, as recommended in the guideline, but 69.9% based on a combination of medical history, physical examination, and diagnostic test.¹⁹ Most physicians even offer allergy testing to patients clinically diagnosed with AR but failing to respond to empiric treatment.

Passali et al²⁴ conducted an electronic survey among 52 experts in Asia, Europe, America, and Africa. Of them, 24 (46%) experts diagnosed AR relying on SPT and 23 (44%) experts relying on total serum IgE and specific IgE tests. An international cross-sectional survey showed the results from Spain that 77 (87.5%) AR was diagnosed by symptoms and SPT, specific IgE, or nasal allergen challenge.²⁵ As shown by a survey in South Korea, 66.7% of 99 primary care physicians believed that the existing guidelines were not sufficient enough to answer the question of “what is the value of skin prick test and serum-specific IgE antibody test in AR diagnosis”, and should be updated to solve real-world problems.¹²

This study found that physicians were most concerned about the efficacy, safety, and minimum age in AR medications, and least concerned about patient preferences. The South Korea’s survey also showed that most primary physicians were concerned about the effectiveness and safety of AR medications.¹² But the published surveys seldom assess the perceptions of otolaryngologists on patient preferences. However, patient preferences have gained an increasing weight in disease management. For instance, GINA clearly recommends the consideration of patient preference in the management of asthma.²⁶ Patient non-adherence to treatment can increase the burden of AR.

Less than half of INS prescriptions, especially immunotherapy, were actually complied with. Patients reported more satisfaction, improved adherence, and lower health-care utilization when

engaged in decision-making.²⁷ In patient-centered communication (PCC) model, patients participate in decision-making processes and share responsibilities with physicians. This model has been widely utilized in developed countries and is becoming increasingly popular in some under-developed countries. AR patients face with different treatment options in real world. A consistent shared decision making (SDM) approach can help them make the requisite care decisions and achieve optimal control.²⁸ ARIA Phase 4 suggested a change management strategy to increase self-medication and SDM in AR and asthma multimorbidity.²⁹ Thus, the Chinese otolaryngologists should consider more about patient preferences, and find an appropriate SDM approach to improve patients’ outcomes.

The present survey also showed that most otolaryngologists agreed with the guideline recommendations on INS, LTRA and H1-antihistamines. To be specific, 86.8% of participants complied with the guideline “often or always recommend INS treatment for no less than 2 weeks and at least 4 weeks for moderate to severe AR to control chronic inflammation of the nasal mucosa”. Otolaryngologists with higher education and from the regions covered in preceding national AR surveys were more likely to comply with this recommendation. Next, 55.7% of participants agreed that “LTRA as the first-line therapy” and 51.2% recognized that “LTRA was more effective than antihistamines in relieving nasal congestion”. Educational background and geographical region had no contribution to these results. An international survey showed that the three most used prescription drugs were INS (87%), oral antihistamines (83%), and anti-leukotrienes (40%).²⁴ The survey conducted in the United States showed that physicians always or often recommended INS (98%) and oral antihistamines (74%) as first-line drugs.²⁴

In the guideline, nasal irrigation is regarded as an adjunctive treatment of AR, which is adhered by 42.4% of otolaryngologists. The international survey showed that less than 30% of patients were prescribed with nasal irrigation.²⁴ Nasal irrigation is a simple and inexpensive treatment for AR. In recent years, the nasal irrigation is readily

available in China, but we should prevent its overuse.

Regarding the use of Traditional Chinese Medicine (TCM) in AR treatment, participants with higher education were more concerned with “not familiar with herb extraction, purification process, and safety, and there is a lack of evidence-based medicine, so recommendations are usually not considered”. In the survey of the United States, 82.5% of physicians “never”, 12.6% “rarely”, and about 5% used herbal therapies.¹⁹

As to the allergen immunotherapy, 65.1% of participants “recommend patients in need to use immunotherapy” and those with higher education tended to use more. In the international survey, 32.69% of responders had prescribed immunotherapy.²⁴ The use of allergen immunotherapy for AR is limited in China as well as in other countries, may mainly be due to the insufficient acceptance by doctors and patients, the potential risk of anaphylaxis, and the high cost of this treatment.¹⁴

The medication scores were primarily used to assess the use of medicine by patients during allergen immunotherapy and surgical treatment. Medication scores can be used to evaluate the pharmaco-economic impact on a disease.³⁰ However, a recently published systematic review indicated that the current medication scores still required extensive validation.³¹ This study found that the medication scores were only used in 14.5% of otolaryngologists, which reflects its limited clinical value.

There are some limitations in the present study. First, since the participation in this survey was purely voluntary, nonresponse bias was hard to avoid. Physicians may just respond seriously to items in which they show interest. Another is that this survey did not apply a standardized random sampling method. Overall, the geographical regions, ages, and education backgrounds were not randomized.

In conclusion, a vast majority of Chinese otolaryngologists complied with the current Chinese AR guidelines. Difference still existed between the clinical practice and guideline recommendations. The otolaryngologists need emphasis on patient preferences. Higher education could improve otolaryngologists’ adherence to the guideline.

ABBREVIATIONS DEFINITION

AR: Allergic Rhinitis, ARIA: Allergic Rhinitis and its Impact on Asthma, ARCPG: Allergic Rhinitis Clinical Practice Guideline, ASPAIR: Asia-Pacific Survey of Physicians on Asthma and Allergic Rhinitis, CME: Continuing Medical Education, CPGs: Clinical Practice Guidelines, GINA: Global Initiative for Asthma, INS: Intranasal Steroids, LTRA: Leukotriene Receptor Antagonists, PCC: Patient-Centered Communication, QR: Quick Respond, SD: Standard Deviation, SPT: Skin Prick Tests, SDM: Shared Decision Making, TCM: Traditional Chinese Medicine

Ethics statement

This questionnaire survey was initiated by the Rhinology Group of the Chinese Society of Otorhinolaryngology-Head and Neck Surgery. Written informed consent was obtained from all participants. The ethics committee of the principal investigator’s university hospital (the First Affiliated Hospital of Nanjing Medical University) has reviewed the research protocol and provided with consent for publication of the data (Approval No. 2021-QT-05).

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding authors on reasonable request.

CONSENT FOR PUBLICATION

The Ethics Committee of the First Affiliated Hospital of Nanjing Medical University has provided with consent for publication of the data (Approval No. 2021-QT-05), and all the co-authors approved and agreed to publish the manuscript.

AUTHOR CONTRIBUTIONS

LC designed the survey and conceived, wrote and revised the manuscript. BZ coordinated the survey and revised the manuscript. All authors contributed to the data collection and analysis, and approved the final version of the submitted manuscript.

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Declaration of competing interest

All authors declare that they do not have any conflicts of interest within the scope of the submitted work.

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Appendix A Supplementary data

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