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Allergic-rhinitis related knowledge, diagnosis, and treatment among general practitioners in Chaoyang District, Beijing☆

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ABSTRACT

Background: Allergic rhinitis (AR) is a highly prevalent chronic non-communicable disease. The research on the understanding and treatment of AR in China is mainly conducted by otorhinolaryngology specialists, but rarely by general practitioners (GPs). And recommendations on the diagnosis and treatment of AR in primary care are also insufficient.

Objective: To explore the knowledge of AR and diagnosis and treatment capacities related to AR in GPs.

Methods: By using simple random sampling, 432 GPs from 21 community health centers of Chaoyang District of Beijing were chosen between August and September 2020. The survey questionnaire was developed based on the Guidelines for the Diagnosis and Treatment of Allergic Rhinitis (Tianjin, 2015) (China 2015 AR Guidelines) and Allergic Rhinitis and Its Impact on Asthma (ARIA) Guidelines:2010 Revision, and its 2016 annual revision following expert consultation and a pre-survey. The questionnaire encompassed basic information, understanding to AR, diagnostic and therapeutic behaviors, training, and support needs regarding AR of GPs.

Results: There were 383 out of 432 total distributed questionnaires returned, with a response rate of 88.7 %. Only 0.8 % (3/383) of the GPs correctly responded to all of the questions on typical AR symptoms, diagnosis, treatment principle, first-line drug categories, and regimens suggested by guidelines. 32.4 % (124/383) of the GPs reported that they knew Guidelines for AR, including China 2015 AR Guidelines and ARIA Guidelines, their sources of knowledge were from online continuing education platform, such as www.haoyisheng.com, www.dxy.cn and social media such as WeChat. When treating each patient with a respiratory disease, the percentage of GPs differentiating AR from other conditions, providing recommendations on environmental control, suggesting nasal rinsing, recommending other treatments instead of immunotherapy, and referring the patient to the specialty department without any treatment, was 59.8 % (229/383), 37.1 % (142/383), 17.8 % (68/383), 49.4 % (189/383), and 13.1 % (50/383), respectively. In terms of pharmacological treatment, 17.5 % (67/383) of GPs reported their facilities offered all four categories of first-line AR medications. As for AR-related training, 75.7 % (366/383) of the GPs reported not having taken any AR-related training in 2019;and 91.7 % (266/290) needed the training. And 95.6 % (290/383) of the GPs reported AR should be treated standardized in the community. The Logistic regression analysis revealed that when encountering patients with respiratory symptoms, GPs with a master's degree or higher〔OR (95 %CI) =2.790 (1.057, 7.366)〕and a good understanding of AR-related health knowledge〔OR (95 %CI) =3.537 (2.015, 6.209)〕were more likely to distinguish AR from other illnesses, GPs with a good understanding of AR-related health knowledge〔OR (95 %CI) =4.397 (0.534, 1.576)〕were more likely to offer patients guidance on environmental control behaviors, GPs who were familiar with nasal irrigation procedures〔OR (95 %CI) =6.592 (3.038, 14.306)〕were more likely to recommend nasal irrigation, and GPs knowing about immunotherapy〔OR (95 %CI) =1.881 (1.087, 3.254)〕, accurately answering questions on the principles of treatment〔OR (95 %CI) =128.330 (16.628, 990.402)〕or their facilities providing some/all laboratory testing services〔OR (95 %CI) =2.210 (1.299, 3.760)〕were prone to recommend immunotherapy.

Conclusion: Despite insufficient knowledge of AR expertise and guidelines, and unsatisfied practice, GPs in Chaoyang District demonstrated proactive attitude towards continuing education and carrying out standardized AR treatment in primary care. As good understanding of AR-related knowledge and guidelines can promote

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quality of practice, relevant training for GPs should be strengthened, and AR-related guidelines applicable to primary care should be developed, which can provide support for the best practice of AR treatment in primary care.

Introduction

Allergic rhinitis (AR) is a common chronic non-infectious, immune-mediated inflammatory disease affecting the nasal mucosa in atopic individuals after exposure to allergens. It is one of the most common non-communicable diseases globally. The chronic course of AR, along with its recurrence and associated conditions like asthma and conjunctivitis, leads to decreased quality of life and negatively impacts the social, educational, and occupational aspects of patients' lives, causing substantial economic burden on individuals and society.[1-4] It is estimated that around 240 million people in China suffer from AR, with approximately 67.51 million experiencing concurrent AR and asthma.[5] Notably, the prevalence of AR is especially high among young adults (18.2 %).[6] Due to socioeconomic development and lifestyle changes, AR has shifted from a minor concern to a significant chronic non-communicable disease. Despite its importance, the AR treatment in China faces challenges, resulting in low level of symptom control.[7-8] Research has shown that guideline-based treatments, regular follow-up, and systematic health education can significantly improve outcomes for AR patients. The availability of medications, patient education, and enhanced adherence are essential for effective symptom management.[9] The role of general practitioners (GPs) is crucial in providing accessible, ongoing, and coordinated care in the standardized treatment of AR. However, recent surveys on GPs' understanding of AR have been predominantly conducted in developed regions, with fewer studies from developing countries. In China, most research on knowledge and treatment practices for AR originates from specialists in otolaryngology and allergy, along with nursing staff, and some of studies related to asthma. Although various AR guidelines have been published locally for otolaryngology, they include limited information applicable to general practice. Research on the knowledge and treatment for AR by GPs in China remains limited.

This study aims to evaluate the knowledge, treatment, and diagnostic practices of Chinese GPs regarding AR, to understand their diagnostic and therapeutic skills, identify their training needs, improve clinical competencies, and offer recommendations for creating community-specific AR guidelines to support better diagnosis and treatment.

Methods

Survey participants

A simple random sampling method was used to select 21 out of 54 community health centers in the Chaoyang District of Beijing from August to September 2020. A cross-sectional survey was administered among GPs in their outpatient departments. Those who worked as a GP, understood the survey's purpose, provided consent to participate, and were on duty during the survey were included. Meanwhile, those on leave for sickness or other reasons and had less than 1 year of clinical experience were excluded.

Survey questionnaire design

The survey questionnaire was designed based on the Chinese Guidelines for Diagnosis and Treatment of AR,[10] ARIA Guidelines: 2010 Revision,[11] and its 2016 annual revision[12] following expert consultation and a pre-survey. The questionnaire comprised three sections with 35 questions in multiple-choice and short-answer formats. The reference answers were derived from the ARIA guidelines. The first section of the questionnaire collected basic information on GPs, including their gender, age, and years of professional experience. The second section focused on their knowledge of AR and relevant guidelines, diagnostic and treatment practices, and available resources for GPs in their facilities. The third section addressed the current status and need for AR-related training and attitudes of GPs toward standardized AR treatment of GPs in primary care. Three questions were presented in a short-answer format, covering topics such as referral criteria and the considerations for diagnosing and treating AR in the community. The remaining questions were formatted as multiple-choice. Responses to short-answer questions were analyzed to extract, classify, and rank the most frequently occurring keywords based on their frequency of appearance.

The criteria for knowledge and behavioral choice questions were as follows: (1) Identification of four typical symptoms of AR, namely, clear nasal discharge, nasal congestion, rhinocnesmus, and sneezing; participants must choose all four to answer correctly. (2) Accurate diagnostic criteria for AR, requiring at least two symptoms lasting for more than 1 h per day. (3) Recognition of the four main treatment principles for AR, including patient education, medication, immunotherapy, and environmental control; participants must choose all four to answer correctly. (4) Selection of the four types of first-line drugs recommended in the guidelines for AR treatment, these include oral second-generation antihistamines (recommended treatment duration≥2 weeks); intranasal second-generation antihistamines (recommended treatment duration≥2 weeks); intranasal corticosteroids (recommended treatment duration≥2 weeks for mild/moderate symptoms;≥4 weeks for severe symptoms); and oral leukotriene receptor antagonists (recommended treatment duration≥4 weeks). Participants must choose one of the options correctly to answer this question.

Survey methods and quality control

This is an electronical questionnaire survey via the http://www.wjx.cn platform. Quality control measures included setting time limits, requiring responses to mandatory questions, establishing minimum character counts for open-ended questions, and restricting IP addresses to Beijing. Each completed questionnaire underwent a manual review to ensure eligibility; responses were excluded if the respondent was not a GP, if the completion time was under 5 min, if all options for a multiple-choice question were selected, or if answers to open-ended questions were nonsensical or repetitive. All 432 questionnaires were returned, yielding a response rate of 100.0 %. Forty-nine questionnaires were deemed ineligible, resulting in 383 valid questionnaires, with an effective rate of 88.7 %.

Statistical analyses

Following the collection, verification, and organization of electronic questionnaires on the www.wjx.cn platform, data analysis was conducted using SPSS 22.0 statistical software. Count data were described using frequency and percentage, while measurement data were presented as mean ± standard deviation. For multivariate statistical analysis, stepwise multiple logistic regression was employed (entry criteria $\alpha_{in} = 0.05$, exit criteria $\alpha_{out} = 0.10$). A P-value of less than 0.05 was considered to indicate statistical significance.

Results

Basic characteristics of GPs

Among the 383 GPs surveyed, 260 (67.9 %) were female. The average age was 40.5 years, with a standard deviation of 8.8 years, and ranged from 24 to 70 years. The largest group of GPs (32.9 %, $n = 126$)

Table 1
Basic information of the 383 general practitioners.

Item	Cases	Item	Cases
Gender		Educational level	
Male	123 (32.1)	Junior college education	65 (17.0)
Female	260 (67.9)	Bachelor's degree	268 (70.0)
Age (years)		Master's or higher degree	50 (13.0)
24–29	23 (6.0)	Type of practice	
30–39	167 (43.6)	Western general practice	196 (51.2)
40–49	138 (36.0)	Other types of western medicine	66 (17.2)
50–70	55 (14.4)	TCM/Traditional Chinese and western medicine	121 (31.6)
Working experience in general practice (years)		Professional titles	
<5	77 (20.1)	Physician	105 (27.4)
5–9	72 (18.8)	Attending physician	228 (59.5)
10–14	126 (32.9)	Associate chief physician or above	50 (13.1)
≥15	108 (28.2)		

Table 2
Survey responses of GPs on symptoms, diagnosis, and treatment principles of AR.

Item	Cases	Item	Cases
AR typical symptoms		Health education knowledge in AR patients	
Correct	207 (54.1)	Did not know	47 (12.3)
Wrong	176 (46.0)	Unsure	179 (46.7)
		Know well	157 (41.0)
AR symptomatic diagnosis		Knowledge of the nasal irrigation procedure	
Correct	161 (42.0)	Did not know	103 (26.9)
Wrong	222 (58.0)	Unsure	101 (26.4)
		Know well	179 (46.7)
AR principles of treatment		Knowledge of AR immunotherapy	
Correct	145 (37.9)	Did not know	185 (48.3)
Wrong	238 (62.1)	Unsure	113 (29.5)
		Know well	85 (22.2)

Table 3
Responses of GPs on medication categories and recommended treatment for AR.

Item	Cases in which this medication category was selected	Cases in which the correct corresponding treatment courses were selected
First-line drugs		
Oral second-generation antihistamines	372 (97.1)	185 (48.3)
Intranasal second-generation antihistamines	312 (81.5)	141 (36.8)
Intranasal corticosteroids	310 (80.9)	170 (44.4)
Oral leukotriene receptor antagonists	360 (94)	141 (36.8)
Non-first-line drugs		
Oral first-generation antihistamines	190 (48.6)	—
Oral corticosteroids	127 (33.2)	—
Oral mast cell membrane stabilizers	234 (61.1)	91 (23.8)
Intranasal anticholinergic agents	247 (64.5)	—
Intranasal decongestants	269 (70.2)	183 (47.8)

Note: — Indicates that no data is available.

had between 10 and 14 years of practice experience. Additionally, 70.0 % held a bachelor's degree, 51.2 % (n = 196) practiced western general medicine, and 59.5 % (n = 228) held the position of attending physician (Table 1).

Knowledge of AR diagnosis and treatment

In the survey, only 0.8 % of the GPs correctly answered all questions on typical AR symptoms, diagnosis, treatment principles, first-line medication categories, and guideline-recommended treatment regimens.

The levels of knowledge varied across different areas: 41.0 % (n = 157) were informed about health education, 46.7 % (n = 179) understood nasal irrigation, and only 22.2 % (n = 85) were knowledgeable about AR immunotherapy (Table 2).

The accuracy in selecting the recommended categories of first-line drugs for AR varied between 80.9 % and 97.1 %. Meanwhile, the accuracy for answering questions about guideline-recommended treatment courses ranged from 36.8 % to 48.3 %. Only 0.8 % of the surveyed GPs correctly identified all four categories of first-line drugs and the corresponding treatment courses as recommended by the guidelines (Table 3).

Only 32.4 % (n = 124) of GPs were familiar with AR guidelines, including the Chinese Guidelines for Diagnosis and Treatment of Allergic Rhinitis and ARIA guidelines, sourced from online platforms (74.2 %, n = 92) such as www.haoyisheng.com, www.dxy.cn, WeChat, as well as training programs (73.4 %, n = 91) (Table 4).

Diagnosis and treatment of AR patients by GPs

When seeing patients with respiratory symptoms, physicians should consider differentiating between diagnosis with allergic diseases and other conditions. According to the survey, 59.8 % of GPs always consider a differential diagnosis for respiratory symptoms. Additionally, 37.1 % consistently provided guidance on environmental control, and 17.8 % regularly recommended nasal irrigation. Meanwhile, 49.4 % of GPs refrained from recommending immunotherapy and 13.1 % referred AR patients without treatment (Table 5). Among those who did not refer patients, 10.4 % (n = 40) cited reasons such as lack of referral criteria knowledge (50.0 %, n = 20), belief that AR problems could resolve independently (40.0 %, n = 16), and uncertainty about referral hospitals (40.0 %, n = 16). GPs who chose to refer patients made their decisions based on specific situation (76.5 %, 293/383), such as the severity of

Table 4
The name of the known guidelines and sources of learning regarding allergic rhinitis in general practitioners.

Item	Cases	Item	Cases
Guideline titles		Learning source	
Chinese Guidelines for Diagnosis and Treatment of Allergic Rhinitis (2015, Tianjin)	119 (96.0)	Haodf, Dingxiangyuan, WeChat and other online continuing education platforms	92 (74.2)
ARIA Guidelines	44 (35.5)	Attend training	91 (73.4)
BSACI Guidelines	23 (18.5)	Communication between colleagues	50 (40.3)
AAAAI/ACAAI/JCAAI Guidelines	30 (24.2)	Academic conferences	51 (41.1)
		Courses in colleges	46 (37.1)
		Other approaches (literature review, Medlive, and other network platforms)	5 (4.0)

Table 5
Behaviors of GPs regarding diagnosing and treating AR.

Item	Cases
Are patients considered to identify from allergic disease for respiratory symptoms?	
Allergic diseases are not considered	8 (2.1)
Differential diagnosis is considered only when the symptoms are typical	146 (38.1)
Differential diagnosis is considered at each time	229 (59.8)
Guide patients on environmental control, such as allergen avoidance	
No guidance	18 (4.7)
Guidance is decided according to the patient's specific situation	223 (58.2)
Guidance at each time	142 (37.1)
Nasal irrigation	
No recommendation	35 (9.1)
Recommendation is decided according to the patient's specific situation	280 (73.1)
Recommendation at each time	68 (17.8)
Immunotherapy recommendation	
No recommendation	189 (49.4)
Recommendation is decided according to the patient's specific situation	162 (42.3)
Recommendation at each time	32 (8.4)
Will you refer patients with AR?	
No referral	40 (10.4)
Referral is decided according to the patient's specific situation	293 (76.5)
Referral at each time	50 (13.1)

symptoms (34.5 %, $n = 101$), effectiveness of treatment (16.4 %, $n = 48$), poor disease control (12.3 %, $n = 36$), and presence of asthma or dyspnea (7.2 %, $n = 21$).

Reception of AR patients and provision of resources

The survey indicated peak periods for AR patient visits occurred in spring (91.1 %) and autumn (73.1 %) seasons, and on days with haze (32.6 %). In 2019, 46.1 % of GPs ($n = 135$) reported that AR patients accounted for 5 % or more of their total outpatient population. Additionally, 17.5 % ($n = 67$) of GPs reported that all four categories of first-line drugs were available in their facilities. It was also noted that 75.7 % ($n = 290$) of GPs had not engaged in any AR-related training in 2019.

Current status and demand for AR-related training

Among the surveyed GPs, 75.7 % ($n = 290$) reported they did not participate in AR-related training in 2019. Among non-participants, a significant majority, 91.7 % ($n = 266$), indicated a desire for AR-related training. Their preferred topics for training included updates on AR primary care guidelines (85.4 %, $n = 327$), basic diagnosis and treatment knowledge for AR (78.6 %, $n = 301$), guidance on nasal irrigation (62.1 %, $n = 238$), interpretation of allergen detection results (53.0 %, $n = 203$), and AR prevention strategies (52.7 %, $n = 202$).

Attitudes and needs towards standardized treatment of AR

Among the GPs, 95.6 % ($n = 366$) advocated for standardized treatment of AR patients within the community. The reasons cited included high AR incidence (23.8 %, $n = 87$), convenience of community treatment (13.9 %, $n = 51$), more standardized treatment and follow-up (7.1 %, $n = 26$), suitability for community diagnosis and treatment (7.1 %, $n = 26$), reducing patient suffering/improving quality of life (2.7 %, $n = 10$), and alleviating difficulties in specialist visits/saving medical resources/realizing tiered diagnosis and treatment (1.9 %, $n = 7$). Conversely, a small minority of GPs (4.4 %, $n = 17$) expressed concerns about treating AR patients in the community, citing factors such as lack of diagnostic capabilities (35.3 %, $n = 6$), absence of necessary examination equipment (35.3 %, $n = 6$), limited medical facilities in the community (29.4 %, $n = 5$), inadequate inspection tools (17.7 %, $n = 3$), insufficient staffing (11.8 %, $n = 2$), and incomplete drug supply (11.8 %, $n = 2$). Support for standardized AR treatment included standard diagnosis training (92.9 %, $n = 356$), community guidelines (86.2 %, $n = 330$), drug and equipment supply(80.4 %, $n = 308$), expert guidance (64.0 %, $n = 245$), and two-way referral (60.8 %, $n = 233$).

Logistic regression analysis of AR diagnosis and treatment behaviors

A stepwise multiple logistic regression analysis was performed to identify factors that influence the diagnosis and treatment behaviors for AR. The dependent variables included demographic information, knowledge, adherence to guidelines and training, and the availability of resources. The variables were coded as follows: gender (male = 1, female = 2); age (<40 years old = 1, ≥ 40 years old = 2); years of experience in general practice (≤ 9 years = 1, 10–14 years = 2, ≥ 15 years = 3); education level (junior college = 1, undergraduate = 2, master's degree or higher = 3); type of practice (western general practice = 1, non-western medicine general practice = 2); professional title (physician = 1, attending physician = 2, associate chief physician and above = 3); typical symptoms of AR, AR diagnostic criteria, AR treatment principles, use of oral second-generation antihistamines, use of intranasal second-generation antihistamines, use of intranasal corticosteroid usage, and use of oral leukotriene receptor antagonist (incorrect = 1, correct = 2); familiarity with AR patient health education (not

Table 6
Logistic stepwise regression analysis of diffffferential diagnosis of AR patients.

Independent variables	*b* value	*SE*	Wald χ^2 value	*P* value	*OR* (95 %*CI*)
Education level (junior college education as reference)			4.328	0.115	
Bachelor's degree	0.487	0.339	2.069	0.150	1.628 (0.838, 3.161)
Master's degree	1.026	0.495	4.290	0.038	2.790 (1.057, 7.366)
Health education knowledge of AR patients (not familiar/unsure as reference)					
Familiar	1.263	0.287	19.351	<0.01	3.537 (2.015, 6.209)

Table 7
Logistic stepwise regression analysis of environmental control guidance.

Independent variables	*b* value	*SE*	Wald χ^2 value	*P* value	*OR* (95 %*CI*)
Health education knowledge of AR patients (unavailable/unsure as reference)					
Familiar	1.481	0.285	26.988	<0.01	4.397 (0.534, 1.576)

Table 8
Logistic stepwise regression analysis of nasal irrigation recommendation.

Independent variables	*b* value	*SE*	Wald χ^2 value	*P* value	*OR* (95 %*CI*)
Nasal irrigation (not familiar/unsure as reference)					
Familiar	1.886	0.395	22.760	<0.01	6.592 (3.038, 14.306)

Table 9
Logistic stepwise regression analysis of whether general practitioners recommend immunotherapy to AR patients as an influencing factor.

Independent variable	*b*	*SE*	Wald χ^2 value	*P* value	*OR* (95 %*CI*)
AR treatment principles (error referenced)					
Correct	0.632	0.280	5.107	0.024	1.881 (1.087, 3.254)
AR Immunotherapy knowledge (not familiar/unsure as reference)					
Familiar	4.855	1.043	21.68	<0.001	128.330 (16.628, 990.402)
Availability of laboratory inspection equipment(not provided as reference)					
Provide some or all	0.793	0.271	8.551	0.003	2.210 (1.299, 3.760)

familiar or unsure = 1, familiar = 2); familiarity with nasal irrigation (not familiar or unsure = 1, familiar = 2); familiarity with immunotherapy for AR (not familiar or unsure = 1, familiar = 2); familiarity with AR guidelines (not familiar = 1, familiar = 2); participation in AR-related training in the past year (never participated = 1, participated = 2); availability of first-line AR drugs (unavailable or partially available = 1, fully available = 2); and availability of AR laboratory testing equipment (unavailable or partially available = 1, fully available = 2).

A binary logistic regression model was established with the dependent variable being the practice of differential diagnosis (no differential diagnosis/only for typical symptoms = 1, differential diagnosis at each consultation = 2). The results showed that factors favoring differential diagnosis at each time included a master's or higher degree and familiarity with health education for AR patients ($P < 0.05$, Table 6).

With environmental control guidance as the dependent variable (unavailable= 1, available based on circumstances=2, available at each time=3), the results showed that knowledge of AR patient health education was a favorable factor for offering environmental control guidance ($P < 0.05$, Table 7).

With nasal irrigation recommendation as the dependent variable (not recommended = 1, recommended based on situation = 2, recommended at each time=3), the results showed that familiarity with nasal irrigation was a favorable factor in recommending nasal irrigation to patients ($P < 0.05$, Table 8).

With the recommendation of immunotherapy as the dependent variable (not recommended=1, recommended based on situation/at each time=2), the results showed that correctly answering questions on AR treatment principles, familiarity with AR immunotherapy, and the availability of laboratory testing equipment were favorable factors in recommending immunotherapy to AR patients ($P < 0.05$, Table 9).

Discussion

Epidemiological research indicated that the prevalence of allergic rhinitis (AR) among adults in China ranges from 10.93 % to 15.45 %.[13] Specifically, a population study in Beijing's Chaoyang District reported a higher prevalence of AR at 25.72 %,[14] showing that AR is as prevalent as other chronic diseases. Significantly, 28 % of individuals with AR also suffer from asthma, underlining the condition's complexity due to its numerous comorbidities.[15] There is a critical need to enhance screening procedures, manage the disease systematically to relieve symptoms, disseminate health knowledge to patients, and reduce complications. China is experiencing substantial reforms in its medical and health system, aiming to promote a tiered diagnosis and treatment system. The 2020 Opinions on Deepening the Reform of the Medical Insurance System highlighted the need for a modern medical service system of collaboration and division between GPs and specialists and strengthening of primary care services as crucial for improving medical service accessibility.[16] The survey results showed a poor knowledge of AR among GPs. Despite the relatively high availability of academic activities and continuing education resources for community GPs in Beijing compared to other provinces, the study revealed that the understanding of basic AR diagnosis and treatment knowledge of GPs is generally moderate. Although China's 2015 AR guidelines have been available for several years, only 32.4 % of GPs are aware of them. This finding aligns with international research, such as a UK study where only 13.8 % of GPs routinely ask about typical AR symptoms.[17] Similarly, knowledge of the ARIA guidelines among GPs in Brazil, Paraguay, and Uruguay showed significant variation, with respective rates of 26.6 %, 62 %, and 6 %.[18] In Nigeria, 46 % of GPs could recognize AR symptoms, 30.2 % had good knowledge, but only 3.2 % had a comprehensive understanding of treatment.[19]

In this survey, 17.8 % (n = 68) of GPs selected a misleading option, "no use of steroids to avoid dependence" in the treatment principles. However, intranasal corticosteroids are crucial in treating AR and are considered as first-line drugs. The Expert Consensus on the Management of Allergic Rhinitis with Intranasal Corticosteroid (2021, Shanghai) clarified that using intranasal corticosteroids does not increase the incidence of common bacterial or fungal infections. Additionally, it has no significant effects on adrenal cortical function, metabolism and growth of bones, or intranasal mucosal structure.[20] Therefore, this misconception requires correction through enhanced continuing medical education. Among the options with incorrect medication duration selection, a significant proportion of respondents opted for a duration shorter than those recommended in the guidelines. These choices in clinical practice may result in inadequate medication duration, poor control of AR symptoms, and adversely impact patient treatment compliance and trust in physicians.[7-8] This survey also highlighted the inadequacy of standardization in the diagnosis and treatment of AR among GPs. Similar surveys revealed that only 0.6 % of GPs in the UK fully apply treatment methods recommended by the ARIA guidelines.[17] In Nigeria, GPs displayed a considerable deficiency in understanding AR treatment.[19] When managing patients with comorbid asthma and AR, GPs and pediatricians in six Asian countries need to improve communication skills and diagnostic awareness to improve disease treatment and management.[21] The results of multivariate analysis of diagnostic and treatment behavior revealed that knowledge significantly impacts the diagnostic and treatment behavior of doctors. Parallel studies in Malaysia and Singapore showed that 30.5 % of doctors consider recommending immunotherapy for patients with AR,[22] which aligns with the findings of this survey. Immunotherapy has been recognized as a first-line treatment for AR for more than a decade, proving its efficacy and safety. GPs have considerable contact with AR patients, allowing them to possess relevant knowledge of immunotherapy and provide appropriate introductions and recommendations for patients. Moreover, the multivariate analysis results indicated that doctors' self-assessment of understanding guidelines and AR-related training in 2019 have no significant impact on diagnostic and treatment behavior. This suggests that current AR guidelines provide limited assistance to GPs, and there is an urgent need to create AR guidelines tailored to primary care and to enhance the practicality of AR training for GPs.

The survey also revealed a positive attitude towards the diagnosis and treatment of AR among GPs, despite insufficient capabilities. Over 90 % of GPs who have not received AR-related training acknowledge its necessity. Furthermore, more than 95 % of the physicians support standardized management of AR within the community health centers. Numerous studies support the idea that standardized management significantly improves the control of AR frequency and symptom severity.[23] GPs agree and aspire to provide standardized AR management within the community.

In February 2022, after this survey was conducted, the Subspecialty Group of Rhinology, the Editorial Board of Chinese Journal of Otolaryngology Head and Neck Surgery, and Chinese Medical Association released the Chinese Guidelines for Diagnosis and Treatment of Allergic Rhinitis (2022, revision) .[24] While these guidelines covered various aspects, including pathogenesis, anti-IgE treatment, combinations of drugs, and immunotherapy, while maintaining consistency in clinical classification, manifestations, allergen detection, diagnostic criteria, and the recommendations for first and second-line medications. These updates in the guidelines highlight the current need for continuous learning and updates in AR-related knowledge. However, the guidelines lack specific recommendations or guidance tailored for AR diagnosis and treatment in primary care, including the referral process between GPs and specialists. The 19th National Congress of the Communist Party of China emphasized the importance of prioritizing people's health, strengthening the medical and health workforce, enhancing disease prevention and treatment capabilities in primary care, innovating medical prevention and control integration mechanisms, and improving the public health system.[25] As AR is a chronic and recurrent condition that necessitates multiple visits, it demands continuous health education and prevention guidance, with a treatment duration typically ranging from 2 to 4 weeks. Reduced patient visits can lead to suboptimal disease control measures and a higher recurrence rate. Therefore, the integration of the primary care workforce into AR management is essential for effective disease control and patient care.

Conclusion

In summary, this survey exposes a significant gap in the knowledge of AR and its guidelines among GPs, alongside a shortage of systematic training and guidelines tailored for primary care. The lack of established referral processes and recognized standards for upward and downward referrals poses considerable challenges. Nonetheless, GPs demonstrate a positive attitude towards acquiring knowledge on AR and adopt standardized AR diagnosis and treatment. Support from higher-level general hospitals, along with initiatives like offering educational resources and incentives, could enhance GPs' clinical skills. Future efforts should focus on creating AR diagnosis and treatment guidelines specifically for primary care, providing regular AR-related training, and fostering collaboration between primary care facilities and otolaryngology, allergy, and respiratory departments in tertiary medical institutes. This would enable standardized management, prevention, education, and referral of AR patients within the community. Such measures are anticipated to more effectively control AR symptoms and disease progression, elevate patients' quality of life, advance tiered diagnosis and treatment systems, and efficiently use medical resources. Due to the lack of recommendations on AR diagnosis and treatment in primary care, this study only refers to specialized AR guidelines, and some parts of the guidelines (e.g., surgical treatment) are not applicable to primary care. The findings of this survey are specific to the area studied and may not be widely applicable. Additionally, the treatment behaviors reported by GPs represent subjective data from the surveyed individuals, and there may be discrepancies between reported intentions and actual clinical practices.

Declarations

Not applicable.

Authors' contributions

Conceptualization, C.N. and Z.Y.; Methodology, C.N. and Z.Y.; Data curation, C.N. and Z.Y.; Formal analysis, C.N. and Z.Y.; Funding acquisition, not applicable; Project administration, not applicable; Resources, not applicable; Supervision, C.N. and Z.Y.; Validation, C.N. and Z.Y.; Writing—original draft, C.N. and Z.Y.; Writing—review and editing, C.N. and Z.Y. All authors have read and agreed to the published version of the manuscript.

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Not applicable.

Consent for publication

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