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ORIGINAL RESEARCH ARTICLE

Closing the knowledge gap in Malaysian pharmacists: a virtual Allergic Rhinitis Boot Camp initiative

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ABSTRACT

Background: In primary care, general practitioners (GPs) and pharmacists are at the frontline to identify, classify and manage patients suffering from allergic rhinitis (AR). The Allergic Rhinitis and its impact on Asthma (ARIA) guidelines aid clinicians in disease management by providing evidence-based recommendations. A recently published ASEAN primary care survey demonstrated that the awareness of ARIA guidelines was high among GPs but notably lower in pharmacists. Hence, this study seeks to evaluate the effectiveness of a Boot Camp education initiative in bridging the unmet needs in pharmacist awareness and education.

Methods: The boot camp was organised as a virtual event. The participants answered the same questionnaire before (pre-assessment) and immediately after (post-assessment) the boot camp session. Statistical analysis was performed on the data paired between the pre- and post- assessments using SPSS v. 25.0 software.

Results: The boot camp survey results showed that second-generation oral antihistamines and allergen avoidance are the most preferred options for AR treatment in pharmacy practice, irrespective of the disease severity. In both pre- and post-assessments, efficacy was ranked as the most important factor considered for choosing an antihistamine and which affects patient adherence. With the boot camp initiative, there was a statistically significant increase in awareness about the patient profiling tool (from 31.6% to 88.2%) and ARIA guidelines (from 40.4% to 91.2%) among the pharmacists ($p<0.05$). The proportion of pharmacists who were able to identify, classify and refer AR patients was significantly increased in post-assessment ($p<0.05$). Post the boot camp, among the proportion of pharmacists (91.2%) who were already aware of ARIA, a high percentage of them further agreed that ARIA guidelines were useful in identifying and treating patients with AR, as well as classifying AR, respectively (97.6%, 95.2%, and 93.5%).

Conclusions: Based on improvements in knowledge and understanding of disease management post assessment, the Allergic Rhinitis Boot Camp initiative is effective and relevant to pharmacy practice. Outreach programs like this reiterate the emphasis on patient compliance and importance of utilizing ARIA guidelines in pharmacy practice that facilitates better management of AR in primary care.

Key words: Allergic rhinitis; ARIA; boot camp; antihistamines; patient compliance; management.

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Introduction

Allergic rhinitis (AR) is an allergen-specific immunoglobulin E (IgE)-driven inflammatory disorder of the nasal mucosa [1]. About 40% of the global population is affected by AR [2] and its prevalence is rising globally [3]. Within Asia-Pacific, the prevalence of AR was found to be 8.7% in the population across eight regions [4]. The International Study of Asthma and Allergies in Childhood (ISAAC) program Phase III provided further evidence on the increasing prevalence of AR in children in non-Western regions, particularly in Asia-Pacific (48.1% for 13-14 years old and 31.6% for 6-7 years old children) [5]. A survey conducted in Singapore also revealed that AR was the key complaint of patients (10-40%) visiting primary care clinics [6].

In the primary care environment, general practitioners (GPs) and pharmacists are key healthcare providers [7]. Specifically, pharmacists are at the front line of AR management facing challenges of identifying and managing varied clinical symptoms in diverse patient populations [8], both in acute and chronic disease management [9,10]. The inclusion of community pharmacists in patient-centric pharmacy care programs has been shown to improve diagnosis, prevention, treatment and control of chronic respiratory diseases [11]. A cross-sectional observational study in Australia highlighted the key role played by pharmacists in the management of AR by identifying patient cohorts who self-select their medications and encouraging such patients to consult with pharmacists about their disease [12]. Correlating back to the management of AR, according to May and Dolen (2017], pharmacists are valuable resources that contribute to selection and optimization of treatment [13].

The Allergic Rhinitis and its impact on Asthma (ARIA) guidelines aim to provide evidence-based recommendations to clinicians for the management of AR and asthma [14,15]. It has previously been reported that adherence to guidelines such as ARIA for the treatment of AR yielded better patient outcomes [16]. However, there is an identified gap between these international guidelines and real-world clinical practice at the primary care level [17]. This challenge is compounded by the complexity of interpreting various treatment algorithms, as well as the low-level awareness of the ARIA guidelines [8,17-19]. To overcome these challenges, researchers from Malaysia introduced the "patient profiling tool" to identify individualized needs and make specific recommendations for each patient profile [8]. Within Asia-Pacific, the findings from a recently published cross-sectional primary care study, conducted among 4 countries (Philippines, Indonesia, Thailand and Malaysia), further demonstrated that the awareness of ARIA guidelines was high among GPs (80%) but notably lower in pharmacists (48.4%). Only 63.3% of GPs and 48.2% of pharmacists in this study knew how to identify AR patients [20]. These findings emphasized the unmet need to strengthen the understanding on AR awareness and the use of relevant guidelines among pharmacists. Therefore, our study seeks to evaluate the effectiveness of a Boot Camp education initiative, in bridging this unmet need in pharmacist education.

Methodology

Boot camp initiative

The AR boot camp was organised in Malaysia, on 25th June 2020 *via* MIMS (Monthly Index of Medical Specialities) as a virtual event, spear headed by the first author (BA). The modules were crafted in collaboration with MSAI committee and endorsed by the MSAI board. The boot camp was divided into 2 sections:

1st section: Overview of allergic rhinitis disease and utilization of ARIA guidelines in AR management followed by Q&A.

2nd section: Introduction of the patient profiling tool to guide the antihistamines selection based on the expert consensus published in 2019 [8] followed by Q&A with the pharmacists.

To assess the effectiveness of the boot camp, responses to the questions in the questionnaire were acquired from the participants before (pre-assessment sent 2 weeks prior to the event) and immediately after (post-assessment) the boot camp session. Results analysis was based on the data paired between the pre- and post-assessments. Ethical approval was obtained from Human Research Ethics Committee USM (Universiti Sains Malaysia) (USM/JEPeM/19050284).

Questionnaire

The questionnaire for the assessment was designed based on the questionnaire deployed in the published survey "Primary care management of allergic rhinitis: a cross-sectional study in four ASEAN Countries" [20]. The questionnaire consisted of 19 questions divided into five sections:

1. Demographics
2. Pharmacy practice
3. Understanding of AR and the guidelines
4. Understanding of ARIA guidelines
5. Post-programme feedback

The questionnaire was uploaded on the MIMS integrated online platform. There were some questions where participants had to select only one option and in some questions, participants could select more than one option. Some questions required the participants to rank the predetermined list of factors in descending order of importance.

Statistical analysis

For evaluation of the responses to the assessment questions, statistical analysis was performed using SPSS v. 25.0 software. Descriptive statistics was performed to calculate the count and percentages of each option of the questions. There were some questions wherein the respondents had selected multiple options. For such questions, the individual options were segregated and their respective counts and percentages were calculated. For ranking questions, the count and percentage of a rank for each option was calculated. To test the significant difference between the two percentages (pre- and post-assessments), Z-test for two proportions was used. Statistical significance was assessed at $p<0.05$.

Results

Characteristics of participants

A total of 136 responses were received, inclusive of hospital and community pharmacists having varying years of experience working as practising pharmacists in Malaysia (Table 1).

Pharmacy practice

This section seeks the responses of pharmacists regarding their real-life pharmacy practice for AR treatment. For this, the participants were asked to mark their responses before (pre-assessment) and immediately after the boot camp (post-assessment) using identical questionnaire with pre-determined multiple-choice options on the topic of treatment preference. For patients with mild AR, the most recommended treatment option from pharmacists was second-generation oral antihistamines with a significant increase between pre- and post-assessment responses. In both pre- and post-

assessments, there was relatively high preference among pharmacists to recommend non-drug therapy options including allergen avoidance and saline douching (Figure 1A).

For patients with moderate-to-severe AR, the most recommended treatment option from pharmacists during pre-assessment was combination treatment of oral antihistamines and intranasal steroids closely followed by allergen avoidance. However, the post-assessment results shifted second-generation oral antihistamines as the most preferred treatment option with a remarkable increase from pre-assessment responses (Figure 1B). Taken together, aligned with the ARIA guidelines, the boot camp initiative demonstrates that second-generation oral antihistamines and allergen avoidance are the most preferred options for AR treatment in pharmacy practice, irrespective of the disease severity (mild as well as moderate-to-severe). On the patient profiling tool for antihistamine selection in allergy management, there was a statistically significant increase in pharmacist awareness with the boot camp initiative (31.6% to 88.2% pre- and post-assessment respectively; $p<0.05$).

When choosing an antihistamine for their patients, in both pre- and post-assessments, the highest proportion of pharmacists ranked "*efficacy*" as the most important criteria (66.9% and 75.7% respectively, $p>0.05$), followed by "*use during pregnancy and breast feeding*" (36.0% and 52.2% respectively, $p>0.05$). Interestingly, in pre-assessment, "*use with co-morbidity*" was placed lower in the rank order (fifth), but its importance significantly increased two-fold in the post-assessment (33.8% to 80.1% respectively; $p<0.05$). The other criteria including "*side effects*", "*age indication*", and "*brand credibility*" were ranked fourth, fifth, and sixth, respectively in decreasing order of importance pre- and post-assessment. Notably, none of the respondents marked the criteria of "*cost*" in their responses.

Patient compliance and management in pharmacy practice

From a predetermined list on factors affecting patient adherence, 32.4% of pharmacists listed "*treatment duration*" as the second most important factor in pre-assessments while in the post-assessments, 46.3% of them chose it as the most important factor

Table 1. Description of respondents who had participated in the boot camp.

	No. of respondents, n (%)
Total	136 (100)
Pharmacists	
Community	64 (47.1)
Hospital	72 (52.9)
Years of experience	
0-5 years	67 (49.3)
5-10 years	32 (23.5)
10-20 years	20 (14.7)
>20 years	17 (12.5)

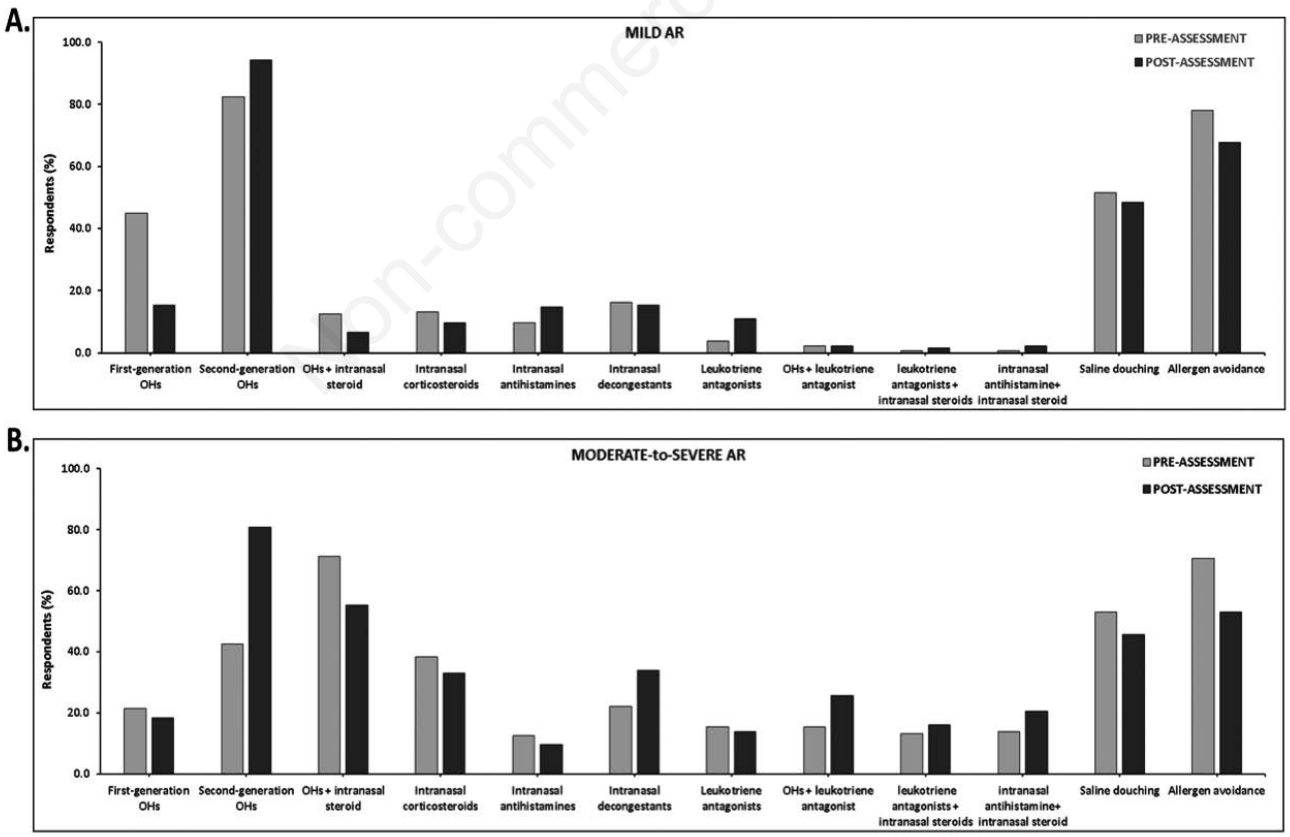

Figure 1. Treatment recommendations by pharmacists pre- and post-assessment in patients with mild (A) and moderate-to-severe (B) allergic rhinitis. AR, allergic rhinitis; OHs, oral antihistamines.

($p<0.05$). In pre-assessment, "*treatment efficacy*" was ranked as most important by 40.4% of pharmacists, unchanged at 46.3% post assessment. "*Administration route*", "*medication cost*", "*medication taste*", "*steroid phobia*", "*lack of symptoms*, "*medication-related adverse effects*" were consistently ranked at second, fourth, fifth, sixth, seventh, eighth positions in both pre- and post-assessments.

With continued focus on pharmacy practice, respondents were asked to rank the importance of various pre-determined factors that contribute to optimal AR management in pharmacy. It was observed that in pre-assessment, majority of the participants ranked "*availability of allergy testing*" as the topmost important determinant of optimal allergic rhinitis management in the pharmacy (30.9%), but this factor dropped to sixth position in ranking in the post-assessment (36.8%). Other important factors including "*allergen avoidance measures*" (45.6% and 43.4%) and "*disease awareness health education for patients*" (44.9% and 44.1%), were listed as the second and third most important determinants in both pre- and post-assessments. The authors would like to clarify that the factors/criteria have independent ranks in pre- and post- assessment based on highest percentage (%) of respondents giving that rank.

Awareness and perception of ARIA guidelines in pharmacy practice

The boot camp initiative resulted in a statistically significant increase in the proportion of pharmacists who were aware of the ARIA guidelines post-assessment (from 40.4% to 91.2%; $p<0.05$). Pre- and post-assessment, most pharmacists agreed that the ARIA guidelines were useful in identifying and treating patients with AR (97.6% and 95.2% respectively) (Table 2). The boot camp initiative resulted in a statistically significant increase in the number of participants who were able to identify patients presenting with AR (from 51.5% to 80.1%; $p<0.05$), as well as a statistically significant decrease in participants who were uncertain about such evaluation (from 41.9% to 18.4%; $p<0.05$) (Table 2). There was also a statistically significant increase in pharmacists who agreed that the evaluation of AR patients for the presence of asthma is necessary (72.8% to 90.4%; $p<0.05$) (Table 2).

Noteworthy, the boot camp initiative demonstrated a statistically significant 2.3 fold increase ($p<0.05$) in the proportion of pharmacists who were able to classify rhinitis based on the frequency and severity of symptoms (35.3% to 81.6%, $p<0.05$) (Table 2). Similarly, the boot camp initiative also increased the proportion of pharmacists who knew when to refer their patients to a doctor/specialist (from 61.8% to 95.6%; $p<0.05$). The proportion of pharmacists who were uncertain about this escalation, decreased drastically from 30.9% to 3.7% (Table 2). Post the boot camp, among the proportion of pharmacists (91.2%) who were now aware of ARIA, a high percentage of pharmacists responded that ARIA guidelines were useful in identifying and treating patients with AR, respectively (97.6% and 95.2%) (Table 3). The proportion of respondents who agreed that ARIA guidelines classified "intermittent" allergic rhinitis based on the duration of symptoms as well as classify allergic rhinitis as "mild" or "moderate/severe" depending on symptom severity and quality of life outcomes were in high percentage (90.3% and 93.5%) (Table 3). Overall, the data has shown a significant importance of utilizing the ARIA guidelines in managing Allergic rhinitis in their clinical practice.

Boot camp initiative

In the post-assessment, 98.5% of pharmacists agreed that the boot camp initiative provided useful information and newer insights relevant to their pharmacy practice, presented at an appropriate level; 98.5% participants were in favour to recommend the boot camp to their colleagues and acquaintances (Table 4).

Discussion

This survey presents findings regarding effectiveness of the AR boot camp in driving changes in the current treatment patterns, attitudes and perceptions of pharmacists engaged in the management of AR. Pre- and post-assessment results demonstrated that second-generation oral antihistamines and allergen avoidance are the most preferred treatment options for AR in primary care practice, irrespective of the disease severity (mild as well as moderate-to-severe). Various factors and criteria were also found significant

Table 2. The responses of pharmacists on statements related to allergic rhinitis management in pre- and post-assessments.

Statement	Responses	Pre-assessment n (%) N=136	Post-assessment n (%) N=136	p
Are you aware of the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines?	Yes	55 (40.4)	124 (91.2)	0.001
	No	43 (31.6)	4 (2.9)	0.226
	Uncertain	38 (27.9)	8 (5.9)	0.186
In your opinion, is it necessary to evaluate patients presenting with allergic rhinitis for the presence of asthma?	Yes	99 (72.8)	123 (90.4)	0.006
	No	8 (5.9)	7 (5.1)	0.944
	Uncertain	29(21.3)	6 (4.4)	0.332
Are you able to identify patients with allergic rhinitis?	Yes	70(51.5)	109 (80.1)	0.001
	No	9 (6.6)	2 (1.5)	0.779
	Uncertain	57 (41.9)	25 (18.4)	0.039
Are you able to classify allergic rhinitis based on the frequency and severity of symptoms?	Yes	48 (35.3)	111 (81.6)	0.001
	No	21 (15.4)	6 (4.4)	0.477
	Uncertain	67(49.3)	19 (14.0)	0.005
Do you know when to refer patients to a doctor/specialist?	Yes	84(61.8)	130 (95.6)	0.001
	No	10 (7.4)	1 (0.7)	0.802
	Uncertain	42(30.9)	5 (3.7)	0.201

to influence the choice of antihistamines, level of patient adherence and optimal AR management. Most importantly, the boot camp resulted in significant increase in the proportion of pharmacists who gained understanding about AR disease and became aware of the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines. This correlated with increased agreement that the ARIA guidelines were useful in identifying, classifying and treating patients with AR. Lastly, the boot camp format and initiative was well received with the attendees, agreeing that it is of relevance to their pharmacy practice and would recommend the course further to their peers.

The survey findings demonstrated that second-generation oral antihistamines were the most recommended treatment option by pharmacists for mild AR patients, with a significant increase in recommendation post boot camp. For patients with moderate-to-severe AR, post boot camp, there was also a significant shift to second-generation oral antihistamines as the most preferred treatment option. These increases are likely to be attributed to an emphasis on ARIA guidelines recommendations during the boot camp training. The preference for second-generation oral antihistamines is in accordance to the ARIA guidelines updates in 2010 that recommended the use of new-generation over old-generation oral antihistamines for the management of AR [21]. In this ARIA update, the use of intranasal steroids over oral antihistamines was suggested in patients with seasonal as well as persistent moderate-to-severe AR [21]. Subsequently, the revised ARIA guidelines in 2016 conditionally recommend the use of intranasal steroids either alone or in combination with oral antihistamines to treat patients with seasonal AR, and intranasal steroids alone in patients with persistent moderate-to-severe AR [15]. Noteworthy, the boot camp results are further in line with results of a published survey conducted in Malaysia to evaluate the treatment practices followed by primary care providers (ENT specialists, pharmacists and GPs) in the management of AR [17]. The survey revealed that 78% and 72% of the pharmacists reported antihistamines as the most preferred choice for the treatment of mild AR and combination of antihistamine and intranasal steroid for moderate-to-severe AR, respectively. Relating to the effectiveness of the boot camp, there was a decline in the proportion of pharmacists preferring first-generation oral antihistamines for mild (44.9% to 15.4%; $p<0.05$) as well as moderate-to-severe AR (21.3% to 18.4%) post the training. This demonstrates the effectiveness of the boot camp in increasing awareness and educating the pharmacists about the potential side effects associated with first-generation oral antihistamines.

Efficacy was identified as the most important criteria when choosing an antihistamine. This is consistent with the results of a survey from Philippines and Malaysia respectively, demonstrating antihistamines to be the preferred treatment choice of primary care providers for AR patients, mainly attributed to their efficacy [17, 22]. Post the boot camp, the criteria of "use with comorbidity" was highlighted as the other significantly important criteria. Comorbidities such as asthma are very important considerations as they can worsen the quality of life [23]. Choicely use of antihistamines with a clear understanding of current comorbidities can aid in the management of AR. Notably, none of the respondents marked the criteria of "*cost*" in their responses. This is likely

Table 3. The responses of Pharmacists on statements pertaining to practice guidelines for allergic rhinitis management in Pre- and Post-assessment.

Statement	Responses	Pre-assessment n (%) N=55*	Post-assessment n (%) N=124*	p
AThe ARIA guideline is useful in identifying patients with allergic rhinitis	Agree	43 (78.2)	121 (97.6)	
	Disagree	0 (0.0)	0 (0.0)	
	Neutral	11 (20.0)	3 (2.4)	
	Undefined#	1 (1.8)	0(0.0)	
The ARIA guideline is useful when treating patients with allergic rhinitis	Agree	43 (78.2)	118 (95.2)	
	Disagree	0 (0.0)	0 (0.0)	
	Neutral	11 (20.0)	6 (4.8)	
	Undefined#	1 (1.8)	0 (0.0)	
The ARIA guidelines, classify "intermittent" allergic rhinitis based on the duration of symptoms	Agree	29 (52.7)	112 (90.3)	
	Disagree	1 (1.8)	4 (3.2)	
	Neutral	24 (43.6)	8 (6.5)	
	Undefined#	1 (1.8)	0 (0.0)	
The ARIA guidelines classify allergic rhinitis as "mild" or "moderate/severe" depending on symptom severity and quality of life outcomes	Agree	41 (74.5)	116 (93.5)	
	Disagree	0 (0.0)	0 (0.0)	
	Neutral	13 (23.6)	8 (6.5)	
	Undefined#	1 (1.8)	0 (0.0)	

No pre- *vs* post-assessment comparisons have been made, hence no p-values are provided; *only respondents who stated "Yes" to the question "Are you aware of the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines?" responded to the questions mentioned in the table; #these participants answered "Yes" to the above question but did not answer the questions mentioned in the table.

Table 4. Immediate feedback after the boot camp session.

Was the information presented at an appropriate level?	98.5
Are the presented topics relevant and useful to your pharmacy practice?	98.5
Did the presentation contain new insights/information that benefit your practice?	98.5
Would you recommend the boot camp to your colleagues and acquaintances?	98.5

attributed to similar costings among branded antihistamines whilst cost differences between branded and generic antihistamines are acknowledged and unarguable. Pharmacists attending this boot camp demonstrated more emphasis on patient care than actual cost of medicine.

The patient profiling tool [8] is a three-step approach that involves i) identifying the individual's needs; ii) reviewing patient-specific considerations; iii) monitoring treatment response and referral to specialists in more severe or difficult-to-treat cases. It serves as a guide to primary care practitioners in prescribing the appropriate antihistamines for each patient. The AR boot camp led to a statistically significant increase in the percentage of respondents who are aware of the patient profiling tool. This is attributed to the training content that discusses the benefits on how the patient profiling tool can help pharmacists better identify their patients' requirement in utilizing antihistamines. Given the preferred recommendation for second-generation antihistamines in pharmacy practice, tools like this are specific and readily actionable to support out pharmacists.

On patient compliance and management in the pharmacy practice, "*treatment efficacy*" was identified by pharmacists as the most important factor. This correlates with the emphasis on efficacy of second-generation antihistamines. Post boot camp, majority of pharmacists selected "*treatment duration*" as the topmost factor for patient compliance. Helping patients to understand the importance of predetermined treatment duration, frequency and mode of administration that compliments their lifestyle and convenience will increase level of compliance to medication [24]. Pharmacists will need to regularly review their patients and educate them to stay compliant to the treatment duration in order to keep their AR symptoms under control. Post boot camp, there was a notable decline (from topmost to sixth) in ranks of "*availability of allergy testing*" as a determinant of optimal allergic rhinitis management in the pharmacy. Although the detection of specific IgE through skin prick or *in vitro* allergy testing is mandatory for diagnosing allergic disease, however the relevance and implementation of allergy testing in pharmacy setting are not readily available and require handling by laboratory technicians. Identification of the causative allergen triggering the allergic response is helpful in advising patients to avoid contact or exposure to the allergen. Avoidance is a key part of management and it is recommended in the guidelines. Pharmacists can advise their patients for this diagnostic procedure to be conducted at a specialized center. If this option is not preferred by patients, pharmacists can stratify the severity of allergic rhinitis according to the presented symptoms. Understanding of the guidelines would help pharmacists to choose the appropriate pharmacotherapy and individualize it for each patient. It is well accepted that for mild form of allergic rhinitis, monotherapy using oral antihistamine or intranasal corticosteroid may be sufficient. In contrast, moderate and severe allergic rhinitis require combined oral antihistamine and intranasal corticosteroid for optimal control of their symptoms. Failure of pharmacotherapy justifies an escalation to specialists for further management [14].

It has previously been reported that adherence to guidelines such as ARIA for the treatment of AR yielded better patient outcomes [16]. However, there is an identified gap between these international guidelines and real-world clinical practice at the primary care level [17]. This challenge is compounded by the complexity of interpreting various treatment algorithms, as well as the low-level awareness of the ARIA guidelines [8,17-19]. The AR boot camp significantly increased the proportion of pharmacist participants i) who are aware of the ARIA guidelines (91.2%); ii) able to identify and treat patients with AR (97.6% and 95.2% respectively); iii) able to classify rhinitis based on the frequency and severity of symptoms guidelines (81.6%); iv) understanding when to escalate patients to specialists (95.6%). These are all important considerations that will drive optimal AR management and these results strongly validated the effectiveness of this boot camp. Moving forward, the authors recommend that all courses focus on updating pharmacists on current guidelines, especially those relevant to which the country their practices are located.

There are several limitations in this study. As the study is piloted in Malaysia, the findings should be interpreted with caution when extrapolating beyond Malaysia. However, it has been shown in previous studies that the pharmacist behaviour across ASEAN is quite similar [20]. The boot camp sought to address the knowledge gap in pharmacy practice but we have yet to evaluate if it has impact to the actual clinical practice. More research is required to translate and validate these findings in real life pharmacy practice.

Conclusions

The Allergic Rhinitis Boot Camp initiative has been evaluated as effective and relevant to pharmacy practice. Majority of pharmacists feedback that such boot camps are beneficial and should be conducted regularly as part of their continuous professional development program. Initiatives like this would empower and sustain the pharmacist fraternity. Consequently, the authors hope that by effectively outreaching to pharmacists, the entire AR ecosystem will be elevated. With a continued emphasis on patient compliance, all healthcare professionals can contribute to better management outcomes of AR.

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Abbreviations

AR: allergic rhinitis;
IgE: immunoglobulin E;
GPs: general practitioners;
ISAAC: international study of asthma and allergies in childhood;
ARIA: allergic rhinitis and its impact on asthma;
MIMS: monthly index of medical specialities.

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