DEVELOPMENT AND VALIDATION OF A NEW KNOWLEDGE, ATTITUDE AND PRACTICE QUESTIONNAIRE ON ALLERGIC RHINITIS PATIENTS TOWARDS INTRANASAL CORTICOSTEROID USAGE

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ABSTRAK

Latar belakang:

Steroid nasal kini merupakan rawatan yang paling berkesan untuk 'allergic rhinitis' (AR) dan merupakan terapi pertama untuk orang dewasa dalam kes-kes 'allergic rhinitis' yang sederhana-ke-parah atau pada individu yang masih simptomatik walaupun sentiasa menggunakan ubatan antihistamin . Walaupun steroid nasal adalah rawatan AR yang paling biasa digunakan, kurang daripada separuh pesakit berpuas hati dengan nasal steroid mereka. Kebanyakan pesakit berhenti rawatan kerana kekurangan kelegaan berpanjangan dan pelbagai sebab lain. Walaupun terdapat banyak kajian dan penghargaan terhadap kepentingan klinikal penggunaan nasal steroid untuk pesakit AR, penyelidikan di kawasan ini telah dihalang oleh ketiadaan soal selidik yang dikhaskan untuk penilaian diri terhadap pengetahuan, sikap dan amalan pesakit AR terhadap penggunaan steroid nasal. Kajian ini direka untuk menilai pengetahuan, sikap dan amalan pesakit 'allergic rhinitis' terhadap penggunaan steroid nasal.

Kaedah:

Kajian soal selidik ini dijalankan di dua buah hospital besar. Proses ini terdiri daripada peringkat pembentukan dan pengesahan. Fasa pembentukan merangkumi kajian literatur, komen panel pakar, ujian kumpulan fokus, dan penilaian soal selidik yang dibentukkan. Tahap pengesahan terdiri daripada pengesahan kandungan, pengesahan parasan, kesahihan pembinaan, analisis faktor penerokaan dan kaedah uji selidik. Cronbach's alpha digunakan untuk mengesahkan konsistensi dalaman. Versi akhir yang disemak telah dirangka. Segmen pengetahuan terdiri daripada lima soalan, segmen sikap terdiri daripada lima soalan dan segmen amalan terdiri daripada empat soalan.

Keputusan:

Seramai 77 peserta telah mendaftar. Dua puluh daripadanya (26%) mempunyai simtom 'mild intermittent', 32 (41.6%) mempunyai simtom 'mild persistent' dan 25 (32.5%) mempunyai simtom 'moderate severe persistent AR'. Sembilan puluh lima peratus menyatakan mereka memahami soalan-soalan dan mendapati mereka mudah dijawab. Sembilan puluh peratus menunjukkan penampilan dan susun aturan yang boleh diterima. Analisis faktor penjelasan mendedahkan empat faktor yang dikaitkan dengan KAP. Cronbach's alpha dari empat faktor adalah dari 0.614 dan 0.809. Soal selidik akhir yang terdiri daripada segmen pengetahuan terdiri daripada empat soalan, segmen sikap terdiri dari empat soalan dan segmen praktik terdiri dari empat soalan yang sah dan boleh dipercayai.

Kesimpulan:

Soal selidik ini mempunyai kebolehpercayaan yang memuaskan dan indeks kesahan dan boleh digunakan untuk mengukur pengetahuan, sikap dan amalan pesakit AR mengenai penggunaan nasal steroid. Kajian ini boleh membangkitkan pengetahuan, sikap dan amalan di kalangan pesakit AR untuk lebih memahami dan seterusnya meningkatkan hasil rawatan dengan mendidik pesakit dan membetulkan persepsi mereka terhadap penggunaan nasal steroid.

ABSTRACT

Background:

Intranasal corticosteroids (INCS) are presently the most effective overall treatment for allergic rhinitis (AR) and are first-line therapy for adults in moderate-to-severe cases of allergic rhinitis or in individuals who are still symptomatic despite the regular use of antihistamines. Although INCS are the most commonly prescribed AR treatment, less than half of patients are fully satisfied with their INCS. Most patients discontinue treatment due to lack of long-lasting symptom relief and other various reasons side. In spite of numerous studies and the appreciation of the clinical importance of INCS usage for AR patients, research in this area has been impeded by absence of a questionnaire devoted to an assessment of self-reported evaluation of knowledge, attitude and practice of AR patients towards INCS usage. This study was designed to assess the knowledge, attitude and practice (KAP) of allergic rhinitis patients towards intranasal corticosteroids usage.

Methods:

This cross-sectional questionnaire study was conducted in two tertiary hospitals. The process comprised of development and validation stages. The development phase encompassed a literature review, expert panel review, focus group testing, and evaluation of the developed questionnaire. The validation phase consisted of content validity, face validity, construct validity, exploratory factor analysis and test-retest method. Cronbach's alpha was used to verify internal consistency. A revised final version was drafted. The knowledge segment consists of five questions, attitude segment consists of five questions and the practice segment consists of four questions.

Results:

There were 77 participants were enrolled. Twenty of them (26%) have mild intermittent, 32 (41.6%) have mild persistent and 25 (32.5%) have moderate severe persistent AR. Ninety five percent indicated they understood the questions and found them easy to answer. Ninety percent indicated the appearance and layout were acceptable. Explanatory factor analysis revealed four factors associated with KAP. The Cronbach's alpha of the four factors ranged from 0.614 and 0.809. The final questionnaire composed of the knowledge segment consists of four questions, attitude segment consists of four questions and the practice segment consists of four questions was valid and reliable.

Conclusions:

The instrument has satisfactory reliability and validity indices and can be used to measure AR patients' knowledge, attitude and practice regarding INCS usage. This study acts as a stepping stone towards deriving the KAP among AR patients to better understand and in turn improve treatment outcome by educating patients and rectifying their perception towards INCS usage.

Keywords: Allergic rhinitis, Intranasal corticosteroids, Knowledge, Attitude, Practice, Questionnaires, Development, Validation

Chapter 1

INTRODUCTION

1.1 INTRODUCTION

Allergic rhinitis (AR) is an inflammatory disease of the nasal mucous membranes. An allergen exposure of allergic individuals results in an IgE-mediated inflammatory response, which can be manifested clinically as nasal congestion, postnasal drainage, rhinorrhea, nasal itching, sneezing, and itchy or watery eyes [1,2].

The prevalence of AR is increasing worldwide, a trend that has been attributed to a variety of factors such as changing global climate conditions, improvements in hygiene, changes in diet, and increased obesity [1]. Allergic rhinitis (AR) is a high-prevalence disease in many developed countries, affecting about 10±20% of the population. Several studies that have been done based on questionnaire, objective testing or medical examination indicate an increasing prevalence of AR in European countries over the last few decades [3].

During the past several years, there has been a growing awareness of the importance of rhinitis in patients with bronchial asthma. Recent studies correlate worsening of asthma with the presence of severe rhinitis and clinical trials with variety of rhinitis treatment have shown significant beneficial effects in mild asthma [4]. The uses of intranasal glucocorticosteroids are highly recommended for treatment of AR and it is the preferred treatment of choice over oral H1- antihistamines, oral leukotriene receptor antagonists, intranasal H_1-antihistamines for patients with seasonal and persistent AR [5].

Intranasal corticosteroids (INCS) are presently the most effective overall treatment for allergic rhinitis and are first-line therapy for adults in moderate-to-severe cases of allergic rhinitis or in individuals who are still symptomatic despite the regular use of antihistamines. Intranasal corticosteroid relieves all symptoms of allergic rhinitis,

including nasal blockage, and meta-analysis shows that are more effective than antihistamines [10, 11].

There have been a number of studies on significant impact of patients' quality of life (QOL), significant consequences of AR on emotional well-being productivity, and cognitive functioning. There is considerable economic burden that include direct and indirect costs caused by absenteeism and decreased productivity at school/work [6].

AR has a significant negative impact on patients' activities of daily living. Evidence suggests that a substantial number of AR sufferers did not receive medical care for their condition in the past year and/or have not been diagnosed with their condition. Although INCS are the most commonly prescribed AR treatment, less than half of patients are fully satisfied with their INCS. The majority of patients perceive that INCS lose effectiveness over a 24-hour period. The most common reasons for patients to discontinue treatment relate to lack of long-lasting symptom relief rather than side effects [1].

In spite the clinical importance of INCS usage for AR patients, research in this area has been impeded by absence of a questionnaire devoted to an assessment of self-reported evaluation of knowledge, attitude and practice of AR patients towards INCS usage.

Chapter 2

OBJECTIVES OF THE STUDY

2. OBJECTIVES

2.1 General objective:

To develop and validate a new questionnaire evaluating the knowledge, attitude and practice of AR patient towards intranasal corticosteroids usage

2.2 Specific objectives:

1. To develop a new questionnaire evaluating the knowledge, attitude and practice of AR patient towards intranasal corticosteroids usage.

2. To assess the validity of the new questionnaire evaluating the knowledge, attitude and practice of AR patient towards intranasal corticosteroids usage in terms of face validity, content validity and construct validity.

3. To assess the reliability of the new questionnaire evaluating the knowledge, attitude and practice of AR patient towards intranasal corticosteroids usage.

Chapter 3

MANUSCRIPT

3.1 TITLE PAGE

Development and validation of a new questionnaire to assess knowledge, attitude and practice among allergic rhinitis patients towards intranasal corticosteroids usage

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3.2 ABSTRACT

Background

Development and validation of a questionnaire to assess the knowledge, attitude and practice (KAP) of allergic rhinitis (AR) patients towards intranasal corticosteroids use.

Methods

The questionnaire comprised development and validation stages. The questionnaire was developed after a comprehensive literature review. It was subjected to content and face validity before a revised final version was drafted. It was given to patients for self-administration. Exploratory factor analysis was used to assess the validity of the questionnaire. Cronbach's alpha was used to verify internal consistency.

Results

The development phase resulted in a questionnaire consisting of 14 items. Explanatory factor analysis revealed four factors associated with KAP. The four factors were extracted and 12 items were kept. The factors were divided as attitude segment with four items (factor 1), practice segment with four items (factor 2) and knowledge segment with four items (factor 3 has two items and factor 4 has two items). The Cronbach's alpha of the four factors ranged from 0.614 and 0.809. The final questionnaire consists of 3 domains with 12 items (the knowledge segment consists of four questions, attitude segment consists of four questions and the practice segment consists of four questions) was found to be valid and reliable.

Conclusions

The newly developed questionnaire to measure KAP of AR patients towards the use of intranasal corticosteroids has adequate validity and reliability. It has an important role to improve the treatment of AR patients by understanding the factors affecting compliance of INCS usage.

Key Words: Allergic rhinitis; Intranasal corticosteroids; Knowledge; Attitude; Practice

3.3 INTRODUCTION

Since the introduction of intranasal corticosteroids (INCS) in 1973 starting with beclomethasone, topical treatments have been successfully used in allergic rhinitis (AR). [1] Subsequently, numerous topical corticosteroids have been developed and marketed which includes flunisolide, budesonide, fluocortinbutyl, fluticasone propionate, triamcinolone acetonide and mometasone furoate. These INCS have a strong anti-inflammatory capacity in reducing mast cells to an extent, while reducing cytokine and chemokine release and can decrease the cellular infiltration of antigen-presenting cells, eosinophils and T cells within the nasal mucosa. [1]

The use of INCS is highly recommended for treatment of AR and it is the preferred treatment of choice over oral H_1-antihistamines, oral leukotriene receptor antagonists, intranasal H_1-antihistamines for patients with seasonal and persistent AR. [2,3] Intranasal corticosteroids are the most effective overall treatment for AR and are first-line therapy for adults in moderate-to-severe cases of AR or in individuals who are still symptomatic despite the regular use of antihistamines. [4,5] Regular prophylactic use of INCS is effective in reducing rhinorrhoea, nasal blockage, itching and sneezing in both children and adults.

AR has been shown to have a significant negative impact on patients' activities of daily living, their quality of life and affects their emotional well-being, productivity and cognitive functioning. [6] There is considerable economic burden that include direct and indirect costs caused by absenteeism and decreased productivity at school/work. Although INCS is the most commonly prescribed AR treatment by doctors, less than half of patients are fully satisfied with their INCS. Most patients perceived that INCS lose effectiveness over a 24-hour period. Some of the most common reasons for patients

to discontinue treatment relate to lack of long-lasting symptom relief rather than side effects. [7] Studies done on knowledge and attitude of nasal steroid perspective among physicians and non-AR patients, studies describing the attitude and practices on AR among different socioeconomic classes, studies on the physician's opinion on the prevention and treatment of AR showed significant knowledge gap among attending physicians and patients. [8-10] Patients were not informed about the safety of INCS, compounding their worry of the possible side effects of INCS usage. [8-10]

Despite the benefit and the appreciation of the clinical importance of INCS usage for AR patients, research in this area has been impeded by the absence of a specific questionnaire devoted to an assessment of self-reported evaluation of knowledge, attitude and practice (KAP) of AR patients towards INCS usage. The knowledge gap and attitude of the patients that are prescribed the INCS adversely affects the outcome of their disease. The aim of this study was to develop a validated questionnaire to assess the KAP of AR patients towards INCS usage, to better interpret and overcome the shortfalls of treatment compliance and efficacy.

3.4 METHODOLOGY

Questionnaire development

The questionnaire was developed after a comprehensive literature review. The preliminary version of the questionnaire consisted of 16 items was given to 8 researchers and experts in the field (7 otorhinolaryngologists and 1 public health physician). They were asked to comment on the context and content of the items. Each reviewer independently rated the relevance of each item on each domain of the questionnaire to the conceptual framework using a 4-point Likert scale (1=not relevant, 2=somewhat relevant, 3=relevant, 4=very relevant). The Content Validity Index (CVI)

was used to estimate the validity of the items whereby a rating of three or four indicates the content is valid and consistent with the conceptual framework. [11] For example, if five of eight content experts rate an item as relevant (3 or 4) the CVI would be 5/8=0.62, which does not meet the 0.87 (7/8) level required, and implies that the item should be dropped. [11] This questionnaire was further pre-tested with 20 AR patients at another hospital not involved in this study whereby the participants were asked to answer as well as highlight ambiguous or problematic items by rating each items on a Likert scale of 1 to 4 (strongly disagree= 1, disagree= 2, agree= 3, and strongly agree= 4). This served to test the face validity of the questionnaire, to assess how meaningful the concepts were to the studied community, the clarity of the wordings and the likelihood the target audience would be able to answer the questions. The layout and appearance of the questions were modified based on the face validation. A revised final version of the KAP towards INCS (KAP-INCS) questionnaire consisting of 14 items was drafted and used. The KAP-INCS questionnaire was divided into two sections, the demographic data and KAP towards INCS usage. The demographic section consists of seven questions such as age, gender, ethnicity, residency, education qualifications, the year of diagnosis and the year nasal spray was prescribed. The second section was the assessment of the KAP towards INCS usage among AR patients. The knowledge segment consists of five questions, attitude segment consists of five questions and the practice segment consists of four questions. For the knowledge segment, dichotomous response of 'yes' and 'no' was administered with a choice of 'not sure' added. Likert-scale questions were used to collect data regarding their attitude and practice. The attitude segment consists of six ordered score being 'totally disagree, disagree, quite disagree, quite agree, agree and totally agree'. The practice segment consists of five ordered score being 'almost never, rarely, sometimes, almost always and always'.

Study setting and participants

The final version of KAP-INCS was given to patients at two tertiary hospitals (Kelantan and Penang) in Malaysia from April 2017 till December 2017 for self-administration. The selected patients were above 15 years old of age, who were able to read and write in English, previously diagnosed as AR and being treated by INCS. Patients with self-diagnosed AR and on self-medicated nasal sprays were excluded from this study. Sample size was determined using factor analysis method with a subject-to-variable ratio of 1:5. [12] Consent was obtained, and anonymity of the participants was maintained. The study protocol was reviewed and approved by the Human Research Ethics Committee of USM and Medical Research and Ethics Committee of Ministry of Health Malaysia and was performed in adherence with the Declaration of Helsinki.

Validation of questionnaire

The exploratory factor analysis and Cronbach's alpha were used to measure construct validity and internal consistency of the KAP-INCS questionnaire. [13] The factor analysis, Kaiser-Meyer-Olkin test (KMO) and Bartlett's test of sphericity were computed to identify the items to be included in the final analysis. A typical factor analysis was performed based on Pearson correlations since the Likert scale could be treated as an interval or ratio scale. Principal axis factoring with rotation method of promax with Kaiser's normalization and scree plot inspection was used to determine the number of factors to retain. According to Kaiser's criterion, all factors with eigenvalues < 1 are dropped. Secondly, the factor analysis was repeated by including and excluding each item until the best combination or reduction was met. Lastly, the factor analysis was again computed to produce factor loading for the final version of the questionnaire. [11] Factor loadings > 0.5 and communalities of > 0.25 were considered acceptable. In

general, correlations of <0.85 between factors are expectable in health sciences. [14] Once the validity procedures were completed, the final version of the KAP-INCS questionnaire was examined to assess its reliability. For internal consistency reliability, a Cronbach's alpha coefficient > 0.65 was considered acceptable.

Statistical analysis

Continuous variables were reported as the mean value ± standard deviation (SD). Bartlett's test for sphericity was to test the appropriateness of the factor model while the KMO measure of Sampling Adequacy was to test whether the partial correlations among variables were small. The KMO statistic ranged between 0 and 1. [15] KMO value close to 1 indicates the sample efficiency and justifiability for factor analysis. From the Pearson's correlation matrix, items that show weak correlation with others would be removed. Cronbach's alpha coefficient was used as an estimate of the internal consistency of the questionnaire.

3.5 RESULTS

Seventy-seven patients consisting of 39 males and 38 females enrolled in this study. The age ranged from 15 to 77 years with a mean age of 36.74. In terms of ancestry, there were 29 Malays (37.7%), 26 Chinese (33.8%), 18 Indian (23.4%) and 4 (5.2%) others, representing local ethnic ratio (Table 1). Their educational background was 2 (2.6%) with either doctor of philosophy or master, 42 (54.5%) with bachelor degree, 9 (11.7%) with diploma and 24 (31.2%) with secondary school certificate. The severity of

AR according to ARIA guidelines [3] showed 20 (26%) have mild intermittent, 32 (41.6%) have mild persistent and 25 (32.5%) have moderate severe persistent. There was no moderate severe intermittent AR.

Content Validity

Based on the comments of the experts, 2 items were deleted as they were ambiguous and did not serve to answer any clinical relevance to the objective of this study. Fourteen items remained consisting of 5 items in knowledge domain, 5 items in attitude domain and 4 items in practice domain. One item on the draft was deemed to be inappropriate because it yielded CVI of $4 / 8 = 0.5$ and was removed and replaced in the questionnaire. That item was Q1 from the knowledge domain, "I recognize the importance of using nasal steroid" and was replaced by "I am aware of the importance of using nasal steroid" (CVI of $8 / 8 = 1.0$). All the remaining items were valid with CVI ranging from 0.87 (7 / 8) to 1.0 (8 / 8) and were retained.

Face validity

All 20 pretested participants rated each parameter at three or four on a Likert scale of 1 to 4. Ninety five percent indicated they understood the questions and found them easy to answer, and 90% indicated the appearance and layout would be acceptable to the intended target group. The remaining items of the questionnaire that underwent statistical analysis after content and face validity, along with their descriptive statistics, are as shown in Table 2, Table 3 and Table 4.

Factor analysis

KMO measure of sampling adequacy was 0.655 (> 0.5) and Bartlett's test of sphericity was appropriate. Thus, a satisfactory factor analysis could proceed. The exploratory

factorial analysis showed four factors with eigenvalue of more than one. This was supported by scree plot which also indicated 4 factors. On the first run of exploratory factor analysis (EFA), the question A-Q2 was marked for deletion as the communalities was 0.223 which was < 0.25. Next the question K-Q1 showed a factor loading of < 0.5 with communalities < 0.25 and was deleted. Then, item extraction and another run of EFA were done. All items showed communalities > 0.25. All factors loading were > 0.5 except for P-Q3 (0.35). All factors correlation coefficient was < |0.85|. However, item P-Q3 was accepted because we deemed it as important to the relevant domain and has significant clinical value in determining the practices of the patient. The four factors were extracted, and 12 items were kept. The factors were divided as factor 1 (A-Q1, A-Q3, A-Q4, A-Q5); factor 2 (P-Q1, P-Q2, P-Q3, P-Q4); factor 3 (K-Q2, KQ3) and factor 4 (K-Q4, K-Q5). Factor correlation (r) ranged from 0.102 to 0.345. The knowledge domain was divided into two factors with items K-Q2 and K-Q3 in one factor (factor 3) and items K-Q4 and K-Q5 in another factor (factor 4) as per the Kaiser's eigenvalue >1 rule and the factors correlation <0.85.

Internal consistency

The Cronbach's alpha was calculated for each factor. The Cronbach's alpha for factor 1 was 0.809, factor 2 was 0.774, factor 3 was 0.735 and factor 4 was 0.614. Even though factor 4 was less than 0.65, for an exploratory research it was considered marginally acceptable reliability [16] and factor 4 was kept in the questionnaire. The final questionnaire consists of 3 domains with 12 items, the knowledge segment consists of four questions, attitude segment consists of four questions and the practice segment consists of four questions as summarized in Table 5.

3.6 DISCUSSION

The prevalence of AR is increasing worldwide, a trend that has been attributed to a variety of factors such as changing global climate conditions, improvements in hygiene, changes in diet and increased obesity. [7] Although INCS is proven to be efficacious for seasonal and perennial allergic rhinitis, patients are still not fully satisfied with their INCS treatment. Poor knowledge and practice pattern among patients towards AR and the causative allergens could be the contributing factors. [17] There was poor awareness of AR among diagnosed and undiagnosed patients and the knowledge about risk of asthma in AR patients was found to be inadequate. [18]

This study provides an assessment on the validity and reliability of a newly developed KAP-INCS questionnaire to assess KAP of AR patients on their INCS usage. Validation of this set of questionnaires which includes content validity, face validity, reliability and factor analysis, is important because it helps physicians to understand the factors affecting compliance of INCS usage in order for them to improve the treatment of their AR patients. It is short and easily understood by patient but covers pertinent questions towards assessing their KAP. Content validity was determined after a review was obtained from the experts in the field. The three domains consist of 16 questions initially which was reduced to 14 questions after the content validation. The layout and appearances of the questions were modified after the face validation by pretesting with 20 AR patients. Finally, the 3 domains had 12 questions with 4 factors.

The knowledge domain of K-Q2 and K-Q3 (factor 3) showed a Cronbach's alpha of 0.735, which was respectable. The factor with K-Q4 and K-Q5 (factor 4) showed a Cronbach's alpha of 0.614 and deemed as marginally acceptable reliability in an exploratory research. [16] The attitude domain had one factor consisting of items A-Q1,

A-Q3, A-Q4, A-Q5 that had a Cronbach's alpha of 0.809, which was very good. The practice domain had one factor as well with items P-Q1, P-Q2, P-Q3, P-Q4 had a Cronbach's alpha of 0.774 (Table 5). Our data showed the newly developed KAP-INCS questionnaire had a good internal consistency and reproducibility. The exploratory factorial analysis in our study showed four factors, in which the items weighed down on a given factor had some shared conceptual meaning and on the other side, the items in different factors measure different concepts. Also, high correlation between items in each of the factors showed their congruence.

Based on content experts' decision (NS, AFI, BA), factor 3 and factor 4 were combined to represent the knowledge domain. Expert opinion is valuable and allowed to combine factors if it answers the objective of a study. Although the Kaiser criterion is to select those factors that have an eigenvalue >1, the general criterion of an eigenvalue > 1 could misrepresent the most appropriate number of factors [19] and Kaiser's criterion is also known for its tendency to over-extract factors. [20] Therefore, ultimately based on content experts' opinion, we adopted a less stringent approach, in order to reach an informative but relatively parsimonious model by combining factor 3 and factor 4 to represent the knowledge domain (Table 6).

Conclusions

Our newly developed KAP-INCS questionnaire proved to be a reliable and valid tool to measure KAP among AR patients towards INCS usage. Understanding their KAP helps health-care providers to target patients and problem areas that need interventions with the ultimate goal of preventing the significant consequences of AR on their emotional well-being, productivity at work or school and improving their quality of life.

3.7 REFERENCES

1. Van Cauwenberge P, Bachert C, Passalacqua G et al. Consensus statement on the treatment of allergic rhinitis. Allergy. 2000;55:116-34.

2. Corren J. The impact of allergic rhinitis on bronchial asthma. J Allergy Clin Immunol. 1998;101:S352-S6.

3. Brożek JL, Bousquet J, Agache I et al. Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines—2016 revision. J Allergy Clin Immunol. 2017;140:950-8.

4. Schofield G, Farooque S. Recommended management and recent advances in allergic rhinitis. Prescriber. 2014;25:21-8.

5. Scadding GK, Durham SR, Mirakian R et al. BSACI guidelines for the management of allergic and non-allergic rhinitis. Clin Exp Allergy. 2008;38:19-42.

6. Katelaris CH, Sacks R, Theron PN. Allergic rhinoconjunctivitis in the Australian population: Burden of disease and attitudes to intranasal corticosteroid treatment. Am J Rhinol Allergy. 2013;27:506-9.

7. Keith PK, Desrosiers M, Laister T et al. The burden of allergic rhinitis (AR) in Canada: perspectives of physicians and patients. Allergy Asthma Clin Immunol. 2012;8:1-11.

8. Navarro-Locsin CG, Romualdez JA. Attitudes, practices on allergic rhinitis of three socioeconomic classes of Filipinos in the National Capital Region. Asia Pac Allergy. 2016;6:94-100.

9. Cingi C, Songu M. Nasal steroid perspective: knowledge and attitudes. Eur Arch Otorhinolaryngol. 2010;267:725-30.

10. Linnemann DEL, Ávalos MAM, Sáenz JL. How an online survey on the treatment of allergic rhinitis and its impact on asthma (ARIA) detected specialty-specific knowledge-gaps.
World Allergy Organ J. 2015;8:1.

11. DeVon HA, Block ME, Moyle-Wright P et al. A psychometric toolbox for testing validity and reliability. J Community Health. 2007;39:155-64.

12. Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. Practical assessment, research & evaluation. 2005;10:1-9.

13. Jackson CJ, Furnham A. Designing and analysing questionnaires and surveys. A manual for health professionals and administrators. 2000.

14. Brown TA. Confirmatory factor analysis for applied research. Guilford Publications; 2014

15. Kheirollahpour M, Shohaimi S. Dimensional model for estimating factors influencing childhood obesity: path analysis based modeling. The Scientific World Journal. 2014; 2014.

16. Hair J, Black W, Babin B et al. Multivariate Data Analysis 7th Ed. Pearson Prentice Hall. 2009.

17. Gupta RS, Springston EE, Smith B et al. Food allergy knowledge, attitudes, and beliefs of parents with food-allergic children in the United States. Pediatr Allergy Immunol. 2010;21:927-34.

18. Zuniga GC, Kirk S, Mier N, Garza NI et al. The impact of asthma health education for parents of children attending head start centers. J Community Health. 2012;37:1296-300.

19. Heppner PP, Heppner MJ, Lee D-g, Wang Y-W et al. Development and validation of a collectivist coping styles inventory. J Couns Psychol. 2006;53:107.

20. Bandalos DL, Boehm-Kaufman MR Four common misconceptions in exploratory factor analysis. In: Lance CE, Vandenberg R J, eds. Statistical and Methodological Myths and Urban Legends: Doctrine, Verity and Fable in the Organizational and Social Sciences. New York, NY: Taylor & Francis; 2008:61-87.

Table 1. Socio-demographic characteristic of patients (n =77).

	Mean (SD)	N (%)
Age	36.74 (18.78)	
Gender:		
Male		38(49.4)
Female		39(50.6)
Race:		
Malay		29(37.7)
Chinese		26(33.8)
Indian		18(23.4)
Others		4(5.2)
Education:		
Phd /Masters		2(2.6)
Bachelor degree		42(54.5)
Diploma		9(11.7)
Secondary		24(31.2)
Aria diagnosis:		
Mild intermittent		20 (26)
Mild persistent		32(41.6)
Moderate severe intermittent		0 (0)
Moderate severe persistent		25(32.5)

Table 2. Descriptive statistics of the items in the knowledge domain.

Scale	Items	Mean (SD)	Yes (n %)	Not sure (n %)	No (n %)
K-Q1	I am aware of the importance of using nasal steroid	1.62 (0.69)	57 (74.0)	11 (14.3)	9 (11.7)
K-Q2	Nasal spray contains steroid	1.49 (0.64)	44 (57.1)	27 (35.1)	6 (7.8)
K-Q3	Nasal steroid has long term side effects	1.39 (0.71)	40 (51.9)	27 (35.1)	10 (13.0)
K-Q4	Nasal steroid is an effective treatment for allergic rhinitis	1.61 (0.59)	51 (66.2)	22 (28.6)	4 (5.2)
K-Q5	I know the correct method of using the nasal steroid	1.65 (0.58)	54 (70.1)	19 (24.7)	4 (5.2)

Table 3. Descriptive statistics of the items in the attitude domain.

Scale	Items	Mean (SD)	Strongly disagree (%)	Disagree (%)	Somewhat disagree (%)	Somewhat agree (%)	Agree (%)	Strongly agree (%)
A-Q1	Allergic rhinitis is a disease I should be giving importance	5.09 (1.03)	2(2.6)	0(0)	2(2.6)	11 (14.3)	32 (41.6)	30 (39.0)
A-Q2	My knowledge of allergic rhinitis is adequate	4.27 (0.93)	1(1.3)	2(2.6)	9(41.6)	32 (41.6)	29 (37.7)	4 (5.2)
A-Q3	It is important that I should know more about my allergic rhinitis	5.08 (1.20)	3(3.9)	0(0)	4(5.2)	10 (13.0)	24 (31.2)	36 (46.8)
A-Q4	I believe allergic rhinitis should be treated regardless of severity	5.27 (0.93)	1(1.3)	1(13)	1(1.3)	6 (7.8)	32 (41.6)	32 (41.6)
A-Q5	I use medications when prescribed by doctors	5.06 (1.03)	2(2.6)	0(0)	3(3.9)	9 (11.7)	35 (45.5)	28 (36.4)

Table 4. Descriptive statistics of the items in the practice domain.

Scale	Items	Mean (SD)	Almost always (%)	Often (%)	Sometimes (%)	Seldom (%)	Almost never (%)
P-Q1	I attend doctor's appointment without fail	4.03 (1.16)	6(7.8)	2(2.6)	8(10.4)	29 (37.7)	32 (41.6)
P-Q2	I use the nasal steroid daily without fail as prescribed	3.73 (0.87)	1(1.3)	4(5.2)	24(31.2)	34 (44.2)	14 (18.2)
P-Q3	I use other prescribed medication without fail	3.49 (1.11)	6(7.8)	6(7.8)	22(28.6)	30 (39)	13 (16.9)
P-Q4	I follow the dosage and frequency of the nasal steroid as prescribed	3.9 (1.04)	3(3.9)	4(5.2)	16(20.8)	30 (39)	24 (31.2)