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Research Article

A Clinical Audit of Allergic Rhinitis Management in the Asthma Clinic at Georgetown Public Hospital Corporation in Guyana

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Abstract

Background: Allergic rhinitis is a common health burden among asthma patients that is unrecognized and not managed optimally.

Research Questions: In patients with allergic rhinitis (AR) and asthma, what are the gaps in allergic rhinitis management that can be improved with British Society for Allergy and Clinical Immunology (BSACI) guideline-based care?

Methods: Data was extracted from the Guyana Asthma/COPD Education and Spirometry Program (GASP) Database onto a Microsoft Office Excel ™. Percentage, mean, and standard deviation were calculated using Microsoft Office Excel™. The data were presented using bar graphs, histogram, and funnel chart.

Results: Of the 367 patients with AR, 38% had mild persistent AR, 28% had moderate-severe intermittent AR, 20% had moderate to severe persistent AR, and 14% had mild intermittent AR. Of the 367 patients, 28% reported overall improvement with oral antihistamines. Of the patients who improved with oral antihistamines, a majority (61%) had mild intermittent AR. Of those who self-medicated with oral antihistamines and add-on AR treatment, 90% reported symptom resolution. Of the 367 patients, only 15%

had been educated on AR triggers while 0% had an action plan done, Additionally, 40% of the 367 patients missed days from work/school and 85% experienced a burden on quality of life. Service goal of 100% was achieved for diagnostics, 15% for AR education, 0% for action plan, 83% for treatment for mild intermittent AR, 22% for mild persistent AR, 5% for moderate-severe intermittent AR and 6% for moderate-severe persistent AR.

Conclusion: Management of AR in the Georgetown Hospital Corporation (GPHC) is variable and does not follow BSACI or any other evidence-based guidelines, resulting in poor AR control and low quality of life for these patients. This clinical audit did not meet its service goal for education, action plan or treatment, only for diagnostics.

Keywords: Allergic Rhinitis; Asthma; BSACI Guidelines; AR Management; Quality of Life; Oral Antihistamines; Clinical Audit

Introduction

Allergic rhinitis (AR) is an atopic disease (an immunoglobulin E (IgE) mediated allergic response) characterized by inflammation of the mucous membrane of the nostril resulting in sneezing, nasal itching, congestion, and runny nose [1]. Additional symptoms include pruritis in the eyes and throat. AR may be referred to as hay fever. It is a heterogeneous disorder that is seasonal AR/hay fever and perennial AR which present with symptoms all year round [2]. In the general population, approximately 20% of cases are seasonal, 40% perennial, and 40% with features of both [3]. Asthma is classified as inflammation of the airways resulting in intermittent, reversible symptoms of bronchial constriction, shortness of breath, coughing, wheezing, and chest tightness [4]. The most common allergens include dust mites, smoke (this can be from cigarettes, factory, burning of garbage, etc.), pollen, animal dander, heavy odor, mold, and irritating fumes [5].

Both conditions occur with exposure to an allergen [5]. To note, 40% of people with AR have asthma, and almost 94% of people with allergic asthma have allergic rhinitis [6].

Over the past decades it has become clear there is a link between these two conditions particularly in allergic individuals. These conditions forming the united airways [6] or one airway one disease [7]. These two conditions share the same airway, have a common genetic background, and have similar inflammatory and immunologic mechanisms [8,9]. An exacerbation in one can led to an exacerbation in the other [9]. Further, having AR increases the risk for asthma and poor control of AR leading to inadequate asthma symptom control [9,10].

Both conditions lead to poor physiologic, physical, social and quality of life with a significant economic burden [7,10]. With every exacerbation comes physical discomfort, anxiety, the fear of death from not being able to breathe, missed days from school and work, sleep deficits, reduced cognitive function and memory loss among other factors [7]. These factors undermine an individual's quality of life especially when under-recognized, ignored, undertreated, or poorly managed [7].

In the government hospitals/health centers in Guyana (where more than 75% of the population seek medical attention), there are no allergy department, diagnostic tests, or allergy medication apart from oral antihistamine, Chlorpheniramine. Allergic Rhinitis is managed by the Ears, Nose, and Throat (ENT) department and/or the family medicine doctors in the community. While asthma is managed by the pulmonologists or family medicine specialists in the community after they spent time being educated by the Pulmonologist in the Respirology department. Asthma management is more structured and follows combined the Global Initiative for Asthma (GINA) and local evidence-based management guidelines. Treatment and diagnostic tests for asthma are also available along with non-pharmacologic management. Asthma prevalence in Guyana is estimated to be 1 in 10 persons [11]. The asthma clinic at Georgetown Public Hospital Corporation (GPHC) has 1121 patients of which 80% have AR [12]. Unfortunately, these patients with AR in the asthma clinic at GPHC do not have their AR managed in in any formal allergy clinic and have not been tested or prescribed tailored evidence-based treatment for the asthma and AR. Furthermore, it seems these patients with uncontrolled asthma and AR self-manage their conditions, and appear confused about which condition is causing an exacerbation or what to do to treat these conditions.

The main components of AR management are listed below. GPHC does not formally use this:

- Diagnostics - AR is a clinical diagnosis, however skin prick test (SPT), specific immunoglobin E (sIgE) or intradermal skin test can be done to identify the culprit antigen(s) [1]. SPT will be considered for this study since it is most used, informative, painless, low risk of side effects, and does not require strict specialist supervision [1,13].
- Education – allergen recognition and avoidance, lifestyle changes, being able to recognize as asthma exacerbation vs an AR exacerbation and manage it at home with a tailored action plan [1].
- Medication [14] – includes antihistamines, decongestants, intranasal corticosteroid steroid spray, intranasal antihistamine stray and immunotherapy [1].

AR is a significant under-recognized, ignored, under-treated disease with a significant health burden [7]. This paper is a clinical audit that aims to assess the current AR management at the asthma clinic at GPHC, compare AR management to the BSACI guidelines, and answer the research question: In patients with AR and asthma, what gaps in AR management can be improved with guideline-based care?

Research question

In patients with AR, what are the gaps in AR management that can be improved with guideline-based care?

Objectives

- To audit the current AR management at the asthma clinic
- To compare AR management to the BSACI guidelines

Methods

Protocol Design, Data Processing and Analysis

- Data Collection Method and Analysis for the different objectives.

Auditing of the current AR management at the asthma clinic

The data was collected from the Guyana Asthma/COPD Education and Spirometry Program (GASP) database. It was examined and identified the diagnosis process of AR. The treatment/management of AR and these findings were compared to the BSACI evidence-based guidelines.

The data collected (Table 1) was recorded in Microsoft Excel™ spreadsheet, checked for inconsistency or missing data, and tallied for analysis. The data collected from the database was a combination of quantitative discrete variables and categorical ordinal, nominal, and binary variables.

Allergic Rhinitis		
Data that will be collected		**Type of Data**
Allergen Identification and Avoidance Education	Yes No	Binary
Type of Allergic Rhinitis	Seasonal Perennial Mixed	Nominal
Stage of AR	Mild intermittent rhinitis Moderate to severe intermittent rhinitis Mild Persistent rhinitis Moderate-to-severe persistent rhinitis	Ordinal

Triggers	Pets/animal dander Mold Pollen Dust mites High scent Smoke (tobacco) Smoke (factories, burning of garbage, etc.) Chemicals/fumes Change in weather Cold air Food Unknown	Nominal
Symptoms	Itching to the eye Itching to the nose Itching to the throat Nasal congestion Rhinorrhea Postnasal drip Sneezing Plugged ears Red and watery eyes	Nominal
Symptoms after treatment	Itching to the eye Itching to the nose Itching to the throat Nasal congestion Rhinorrhea Postnasal drip Sneezing Plugged ears Red and watery eyes	Nominal

Treatment	Intranasal steroid Intranasal antihistamine Oral antihistamine – 1st generation Oral antihistamine – 2nd generation Oral decongestants Intranasal cromolyn Intranasal anticholinergics Leukotriene receptor antagonists Intranasal ipratropium Immunotherapy	Nominal
Exacerbation frequencies	Daily or 2-3 times per week More than 3 times per week 2-3 times in 1 month More than 3 times in 1 month Seasonal	Ordinal
Diagnostic test done	Clinical diagnosis Skin Prick Test (SPT) Intradermal Skin Test Specific IgE	Nominal
No. of ER or unplanned visits in the last 3 months for AR exacerbation	1 2 3 4 ≥5	Ordinal
No. of admission for an AR exacerbation in the last 3 months	1 2 3 4 ≥5	Ordinal

No. of missed days from work/studies in the last 3 months because of an AR exacerbation.	1 2 3 4 ≥5	Ordinal
Symptoms affecting sleep	Yes No	Binary
Symptoms affecting memory/concentration	Yes No	Binary
Symptoms affecting performance at work or school	Yes No	Binary
Symptoms affecting socializing	Yes No	Binary
Symptoms affecting comfortable breathing secondary to upper airway congestion	Yes No	Binary
Symptoms causing anxiety	Yes No	Binary
Symptoms causing stress/depression	Yes No	Binary
Competency in nasal spray/drop technique	Yes No	Binary
Self-management plan done	Yes No	Binary
Adherence to medication	Yes No	Binary
Use of other medication to control AR	Herbal Prednisone/Prednisolone (oral) Additional Antihistamine (oral) Corticosteroid nasal spray	Nominal

Table 1: AR Audit Data Sheet.

Microsoft Excel™ was used to analyze the data using percentages, means and standard deviations (SD). It was then presented using a histogram, bar graph, and funnel chart.

Comparing AR management to the BSACI evidence-based guidelines

The data was examined regarding steps to diagnosis, treatment and management of AR compared to the BSACI evidence-based guidelines to diagnose, treat, and manage AR. A check sheet was used to identify the gaps in AR management compared to the BSACI evidence-based guideline.

The clinical audit aimed to achieve a service goal of 85% - 100% in the following areas:

- Asthma/AR education (allergen identification and allergen avoidance education) – Service goal achieved at 85%
- Action plan (steps to follow when an exacerbation occurs) – Service goal achieved at 100%
- Diagnosis: Clinical diagnosis, Spirometry, SPT, Specific IgE, other – Service goal achieved at 85%
- Treatment: This is subdivided into stages:
  - **Intermittent rhinitis**: Divided into mild and moderate – severe: occurs less than 4 days a week and for less than 4 weeks per episode.
  - **Persistent rhinitis:** Also divided into mild and moderate – severe: occurs at least 4 days a week and 4 ≥ 4 weeks per episode.

Mild rhinitis refers to minimal symptoms that do not affect quality of life (QoL) whereas severe affects QoL by disrupting sleep, causes missed days from work or school, etc. [15].

For each stage, service goal achieved at 85%.

The step-up to this treatment algorithm (Figure 1) depicts each stage that should achieve a service goal of 85%. The service goal achievement was analyzed and presented in Table 2 highlighting the areas in AR management that met and did not meet the service goal.

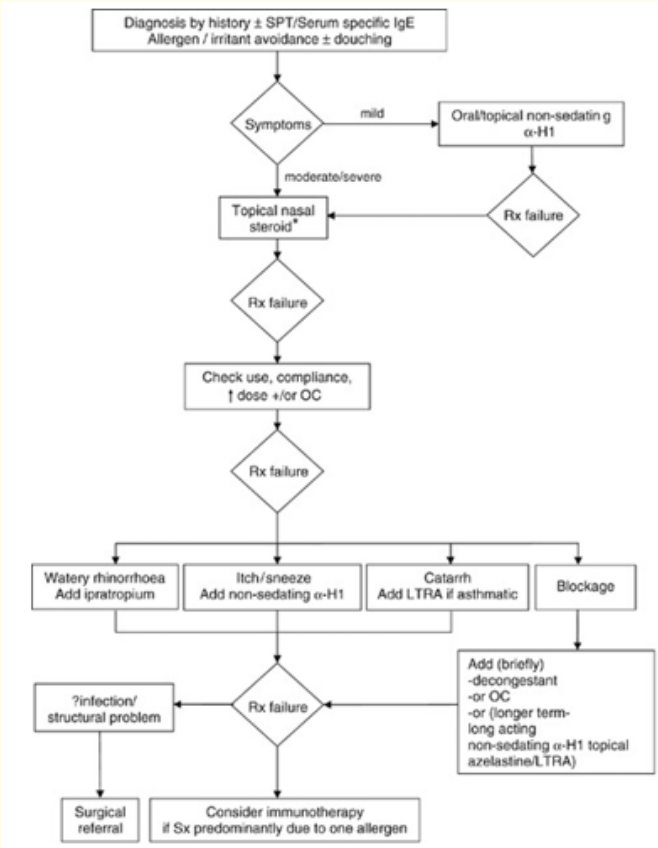

Figure 1: Treatment Algorithm for AR [15].

All the objectives were carried out and achieved by the researcher. Patient safety is always a priority; however, this clinical audit goal was to improve the quality of service by ensuring AR is managed by the asthma clinic according to BASCI evidence-based guidelines and avoid placing the patient's safety in jeopardy. There was not any contact with patients or their health records. The data was collected from GASP database and a literature review was done on BSACI guidelines on the management of AR.

The GASP data (patient history, physical examination findings, diagnosis, diagnostic method, treatment plan, progress at each follow up (for the first 10 follow-ups), age, religion, ethnicity, address, education level and referral center) are entered into the database by a data entry clerk and anonymized/deidentified. The patient's name and reference number were not used. The data were encrypted, password-protected and accessible to the researcher

only. Th. A copy of the data will be stored on the University's networked storage for a minimum of 10 years [16].

Type of study, subjects, ethics, and research governance

Type of Study

- Clinical Audit

Study population

The clinical audit examined GASP database shared with a study population of patients ages 18 or greater identified as having AR who were seen at the asthma clinic between 2020- 2023.

Inclusion and exclusion criteria

The inclusion criteria

- Age 18 years and older (there is no cut-off age/upper limit to the clinic)
- Must have a history of AR and asthma.
- Spirometry confirming asthma based on the American Thoracic Society (ATS) quality criteria.
- Must have maintained regular follow-ups (at least 10) within the 3 years 2020 - 2023.

Exclusion criteria

Patients seen before or after 2020 and 2023.

Number of persons for this study

The maximum number for this study was 367 patients, who were 18 years of age and older, with the diagnosis of AR who were seen in the asthma clinic between 2020-2023 identified in the GASP database.

Identifying and approaching the participants to be part of this clinical audit:

This is a clinical audit. Data were collected from the GASP database. GASP was formed in Guyana in November 2013. It is a non-governmental, non-profit program funded via grants by the Chiesi Foundation based in Italy. This program offered spirometry tests, asthma/COPD education, asthma/COPD clinic, and training of healthcare staff in areas of obstructive lung disease. A database (GASP database) was created to keep track of the program impacts/outcomes and to obtain continuous funding. The database is accessible only to the program staff in Guyana and the Chiesi Foundation Guyana GASP team. The data were anonymized/ deidentified and focused on health economics data, epidemiology, impacts, and outcomes of diagnosis and treatment management. It is not a patient electronic health record.

Ethics and research governance

This clinical audit was conducted after:

- Approval was given from the Head of Medical Services, Georgetown Public Hospital Corporation.
- Approval was granted from the Faculty of Medicine, University of Southampton through the ERGO platform.
- Sponsorship – Georgetown Public Hospital Corporation

Results

There were 367 (n = 367) patients diagnosed with Asthma and AR registered into the asthma clinic between January 2020 – December 2023. Of these 367 patients, 50 % had perennial allergies, 28% had seasonal allergies and 22% had mixed perennial and seasonal allergies.

Furthermore, AR is staged based on the symptom's severity and length of time AR persists. Of the 367 patients, 38% had mild-persistent AR, 28% had moderate-severe persistent AR, 20% had moderate-severe persistent AR, and 14% had mild intermittent AR.

The most common trigger for AR is change in weather as found in 22% of the patients. 11% were found to have multiple triggers for AR exacerbation. These were, in addition to change in weather, cold air, dust mites, high scent and smoke from both tobacco and environment (environmental smoke were from the burning of garbage, fields, emission from factories and other industrial sites). Only 9% of the patients were affected by cold air, this is the air at night or from the air conditioning (AC) units in offices, homes, or vehicles. Few patients (8%) were triggered by dust mites, 6% of patients were triggered by smoke from tobacco or a combination of dust mites, animal dander and mold. 5% of the patients were triggered by smoke from the environment or by animal dander respectively, while 4% of the patients were triggered by high scents. Chemicals/fumes and multiple trigger (high scent, dust mites, smoke from tobacco) affected 3% of patients respectively, while 2% were affected by pollen and 0.5% were affected by mold and food each. 11% of the patients were not sure what triggered their AR.

The most common presenting symptoms were a combination of nasal congestion, sneezing, and rhinorrhea in (19%) of patients. 14% had nasal congestion, 12% had combine symptoms of sneezing and rhinorrhea and 9% with rhinorrhea and combine rhinorrhea and postnasal drip. After treatment, 28% of patients had improvement in symptoms. 9% of these patients with combine symptoms of nasal congestion, sneezing and rhinorrhea has symptom improvement, 6% had relief with nasal congestion, 4% each has resolution with combine symptoms of sneezing and rhinorrhea and postnasal drip and rhinorrhea (Figure 2).

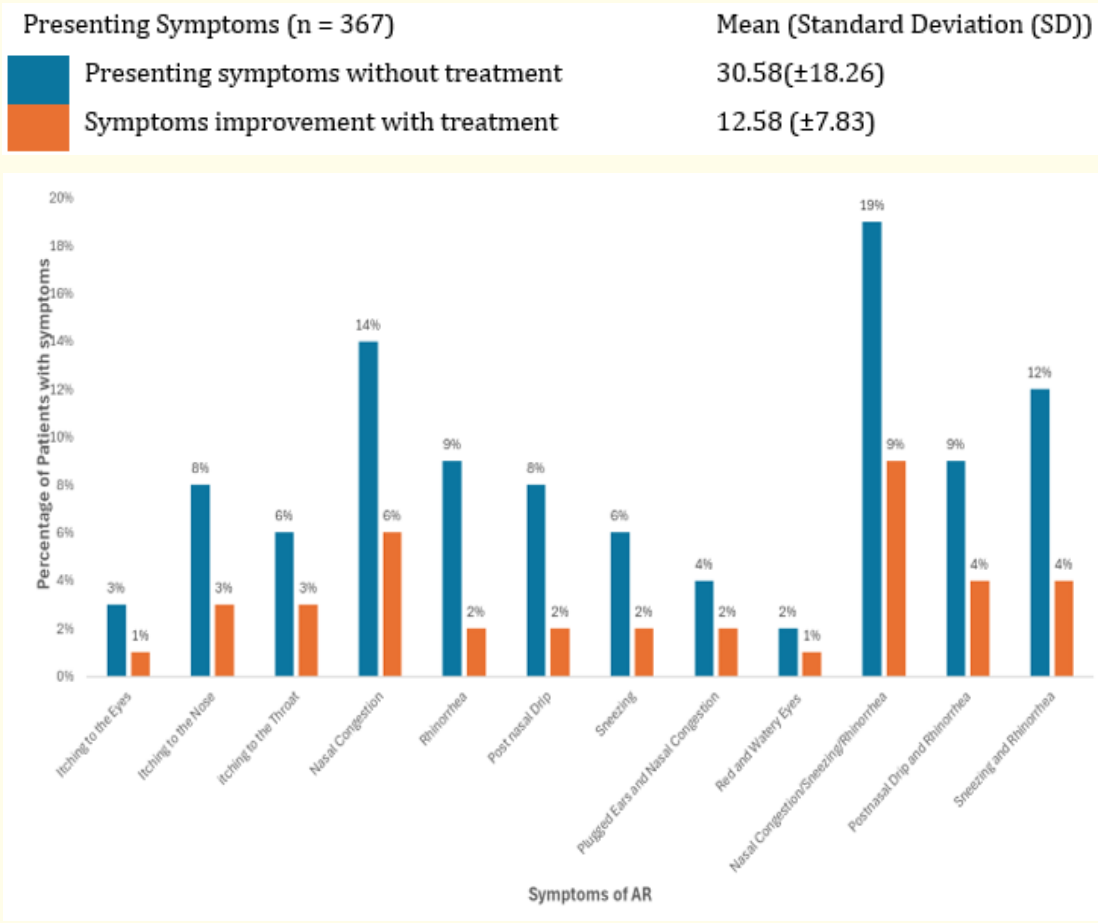

Figure 2: Symptoms Resolved with Treatment.

The most common treatment given to all patients (n = 367) regardless their stage of AR was oral antihistamine chlorphenamine. Of these patients, 28% had symptom improvement while 73% had no significant improvement in symptoms. Of the 28% (n = 101) of patients that had symptom improvement with oral antihistamine only 61% had mild intermittent AR and 31% with mild persistent AR. For moderate-severe cases, 5% and 3% for moderate-severe intermittent AR and moderate-severe persistent AR respectively had relief with oral histamine only.

About one-third of patients (n = 129,35%) benefitted from (Figure 4) being self-medicated with additional treatment. While almost half (48%) of these patients who self-medicated used

additional oral antihistamines (Cetirizine and Loratadine) along with prednisone and/or herbal treatment. Some patients (16%) used prednisone as an add-on to chlorphenamine had symptom resolution while 13% used herbal treatment in addition to chlorphenamine.

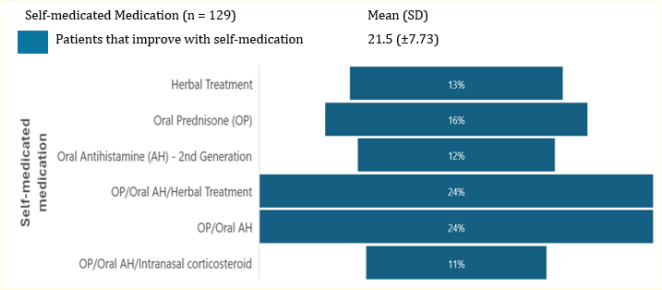

Figure 3: Percentage of patients that self-medicated results.

Education on allergen identification and avoidance was done with 15% of patients diagnosed with AR. 0% of patients had an action plan or allergy diary done while 26% showed adherence to treatment.

The diagnosis for AR is mainly clinical. 79% of patients were diagnosed clinically while 14% had SPT, 6% had specific IgE (sIgE) and 1% had intradermal test added to their clinical diagnosis.

40% of the patients took "off day" either from work or school because of an exacerbation within the past 3 months. Most patient (88%) reported 2-3 episodes of severe exacerbation within 3 months resulting in them staying home. About one third (35%) of the patients did not miss work or studies but self-medicate to manage symptoms: either single or combination of these: herbal, prednisone, oral antihistamine, corticosteroid nasal spray. Additionally, few (16%) patients visited their family medicine doctors in the community for treatment while 4% visited the ER. Only 5% of patients were noted to have admission however this was not recorded secondary to AR exacerbation. According to GASP database, these patients did present with nasal congestion, rhinorrhea along with headaches, coughing, +/- fever, body aches, +/- asthma exacerbation and were diagnosed with community acquired pneumonia.

Furthermore, greater than 50% of the patients reported to have at least 1-3 exacerbation in a month while 10% reported no exacerbation in 3 months. Patients with moderate-severe persistent AR reported have exacerbation 1-2 times in a week, similar trend noted for mild persistent AR.

Factors that contributed to a poor QoL for patients with AR (Figure 4) included inability to breathe comfortable (28%) followed by the inability to sleep comfortable (22%). 11% of the patients reported poor performance at work or school, 9% reported social issues where persons think they have a contagious flu and do not want to be next to them leading to social withdrawal. 8% reported anxiety from not being able to breathe and that combine with asthma makes them very anxious. 4% reported being "fed-up"/stressed or depress with their AR. This group of patients are among those with moderate to severe persistent AR. Very few patients (2%) reported that AR affect their memory or ability to concentrate. On the other hand, 16% of the patients with AR had no effect on QoL. These are the patients with symptom control and are among those with mild intermittent AR.

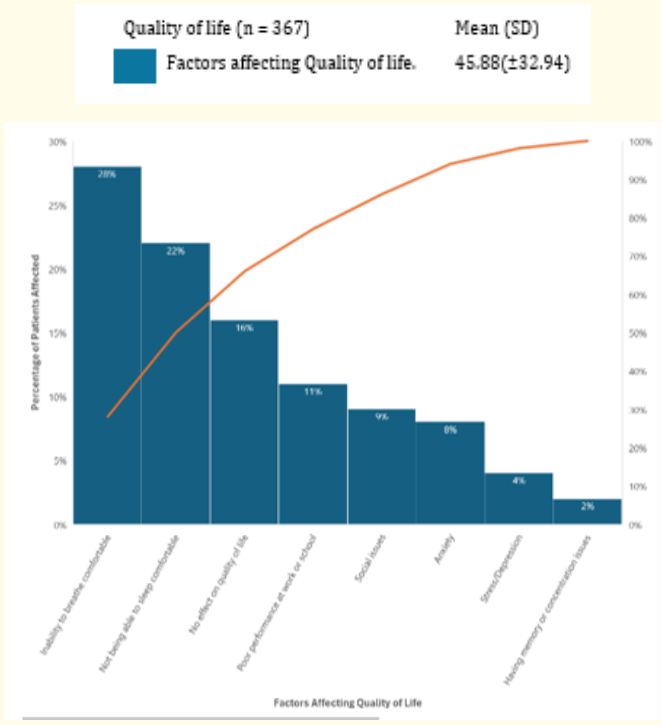

Figure 4: Factors affecting quality of life in patients with AR.

Service goal

Service Goal	Expected Service Goal	Actual Service Goal
Allergic Rhinitis Education	85%	15%
Action Plan	100%	0%
Diagnostics	85%	100%
Treatment		
Mild intermittent AR	85%	83%
Moderate-Severe intermitted AR	85%	5%
Mild persistent AR	85%	22%
Moderate-Severe persistent AR	85%	6%

Table 2: Service goal of clinical audit of AR management at the Asthma Clinic.

Note, no evidence-based treatment algorithm was used to step-up or step-down treatment based on patient symptoms thus a service goal of 0%. Education achieved a service goal of 15%. None (0%) of the patients had an action plan done in the event of an exacerbation. One the other hand, all of them were diagnosed clinically. 21% of the patients had in addition to a clinical diagnosis, SPT, sIgE or intradermal test thus diagnosis achieved a service goal of 100% (Table 2).

Treatment was divided as per stage, mild intermittent achieved a service goal of 83%, mild persistent AR achieved a goal of 22% while moderate-severe intermittent and persistent AR achieved a service goal of 5% and 6% respectively (Figure 5 and Table 2).

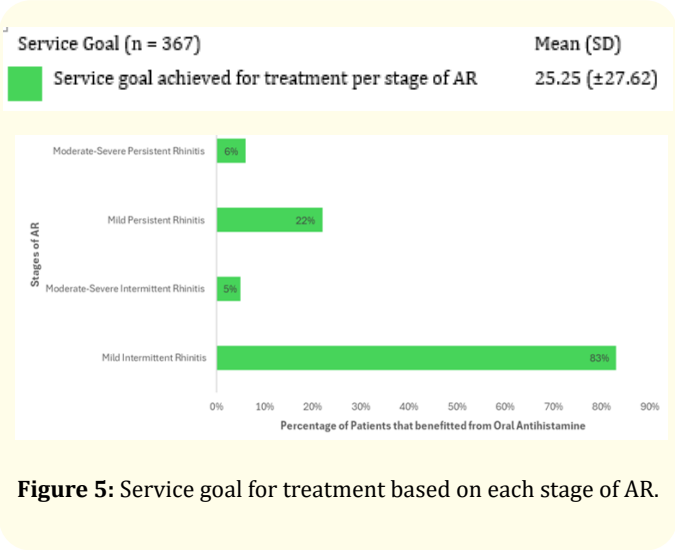

Figure 5: Service goal for treatment based on each stage of AR.

Comparison of AR management as per BSACI guidelines

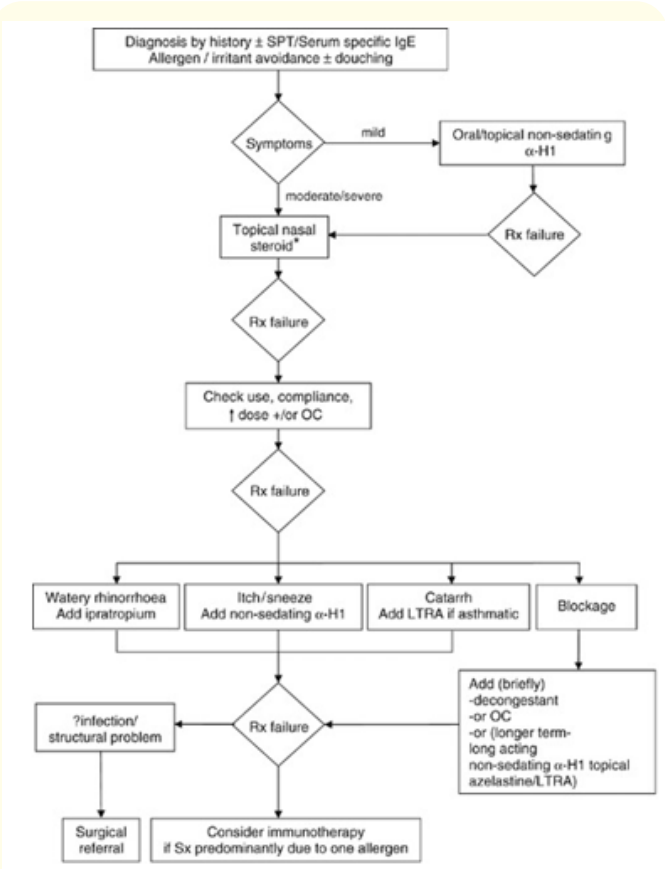

Figure 1: Treatment Algorithm for AR [15].

BSACI used the treatment algorithm (Figure 1), and the first step is diagnosis: history, +/-SPT, sIgE, allergen/irritant avoidance and +/- sinus rinse. All the patients received a diagnosis. Allergen identification and avoidance was not stressed upon, 15% of the patients received some form of education session. Based on presenting symptoms and duration, BSACI placed patients into mild category with the recommendation to use oral or intranasal antihistamine. Oral antihistamine was used, 61% of the patients with mild intermittent AR and 31% of the patients with mild persistent AR got relief. For those with moderate-severe symptoms, initial treatment recommended is an intranasal corticosteroid. Unfortunately, AR patients at this stage were not given this treatment. Despite this, 3% of moderate-severe persistent rhinitis and 5% of moderate-severe intermittent rhinitis got relief with oral antihistamine (Chlorphenamine). Patient self-treated by adding on additional oral antihistamine, increasing the dose, or switching to a 2nd generation oral antihistamine, add-on oral corticosteroid and/or intranasal corticosteroids with significant improvement in symptoms, Figure 6 shows that of the 129 patients that self-medicated, 90% reported symptom improvement, the remaining 10% got improvement but did not achieve complete or sustained symptom improvement.

Comparing BSACI guidelines for the treatment of AR to what is being done as shown in the check list (Table 3) highlight the gaps in AR management.

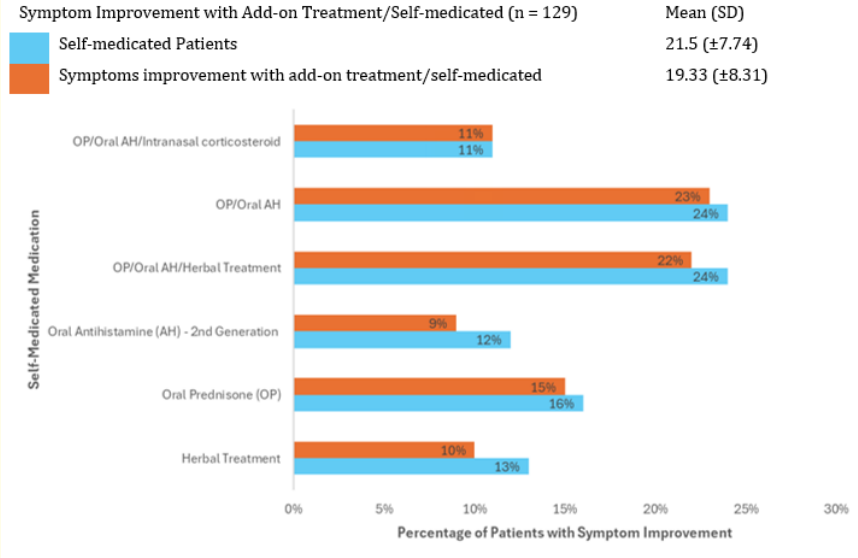

Figure 6: Symptom improvement in the patients that self-medicated.

BSACI evidence-based Guidelines	
History, +/-SPT, serum specific IgE, allergen/irritant avoidance and +/- sinus rinse	
Education on allergen identification and avoidance	Not done for everyone
Staged the patients	
Mild symptoms: Oral or intranasal antihistamine	
Moderate-Severe: Intranasal corticosteroid	X
Check use, concordance, dose	X

Step up with combine treatment	X
Add-on treatment based on symptoms:	
Watery rhinorrhea - Add ipratropium	X
Itch/sneeze/extra nasal itch/ rash switch to non-sedating oral anti-H1	X
Catarrh - Add leukotriene receptor antagonist (LTRA) if asthmatic	X
Nasal congestion - Add (briefly) - intranasal decongestant	X
If treatment fail, consider options 1-3:	
1. Inflammatory rhinitis – treat with a course of oral corticosteroid and continue local treatment	X
2. Consider infection – treat infection Structural problem - Surgical referral	X
3. Consider immunotherapy if treatment is predominantly due to one allergen	X

Table 3: Checklist comparing BSACI guidelines to what is practice at the Asthma Clinic for the management of AR.

Note: star represent what is practiced, X represent what is not practiced.

Discussion

AR is a common condition affecting 10-40% of the general population worldwide [17]. This audit study aimed to assess the current AR management at the asthma clinic at GPHC and compared the current AR management to BSACI evidence-based guidelines.

Types of allergies

There are two types of allergies, seasonal and perennial. Half of the patients (50%) were noted to have perennial allergies, 28% with seasonal allergies and 22% with characteristics of both seasonal and perennial allergies. Shweta and Steven [18] presented perennial allergies to be 40% followed by seasonal allergies to be 20%. However, mixed type was noted to be 40%, significantly higher from this study [18]. The most common presenting symptoms of the patients in this study were nasal congestion, sneezing and rhinorrhea, however, there were additional associated symptoms in ≤ 6% of patients: postnasal drip, itching to nose, throat, and eyes, plugged ears and red, watery eyes. Same was describe by Shweta and Steven [18].

Allergens

Allergen, a foreign protein, that is usually harmless, can cause an allergic reaction in persons with a dysregulated immune system [18]. Change in weather conditions is not an allergen but is a trigger for AR exacerbation as change in weather contains different concentration of allergens in the environment such as pollen or mold. This paper found 22% of the patients reporting when the weather changes, they notice changes in their AR, this could be from pollen or mold, or non-allergic causes associated with weather changes such as changes in humidity or temperature. Cold air from AC units or in the night, smoke from cigarettes or from the environment produced from burning of garbage, emission from factories, fumes from paint (auto shop paint and pesticides from spraying of the fields) are pollutants/irritants which can trigger rhinitis with similar symptoms as AR [19]. BSACI evidence-based guidelines recommended a different treatment approach for non-allergic rhinitis providing AR is excluded via SPT and history. Intranasal ipratropium for watery rhinorrhea, if inflammation is present, intranasal corticosteroid (INC) or combine INC with intranasal antihistamine and if mixed type, combine both therapies [15].

In this study dust mites were identified to be one of the leading allergens (32%), this is supported by a study in Chennai, India where dust mites were the chief cause (93.3%) for AR [20]. Other allergens noted in this study were animal dander (15%), mold (6.5%) and pollen (2%).

Diagnosis

To diagnose AR, Small., *et al*. [21] stressed this is based on clinical symptoms and this study found all of patients were diagnosed clinically for AR. Moreover, this study identified additional diagnostic tests done to determine the allergens leading to AR [15,21,22], similar with this study where 14% of the patients

were diagnosed with SPT and 6% with sIgE. Diagnostic tests are under used because it is not available at the government healthcare services where healthcare is free. Doing this test is optional to the patient and costly at the private hospitals/labs where it is available [23].

Classification/stage of AR

The BSACI algorithm, Scadding., *et al.* [24] and Small., *et al.* [21] all staged AR into two or four severities: mild (intermittent and persistent) and moderate-severe (intermittent and persistent), a step-up and step-down treatment plan based on the patient's response, and how each treatment controls symptoms [15]. The classification of AR in this study were congruent.

Treatment

First generation oral antihistamine, chlorphenamine, was the only medication given to patients presenting/diagnose with AR despite the stage/severity of the condition.

Oral antihistamine

This study included 367 patients of which 23% had symptom improvement with oral antihistamine, 1st generation. Of these that got help, 61% of them had mild intermittent symptoms. Scadding., *et al.* [24] findings stressed oral antihistamines were the drug of choice for patients with mild rhinitis thus the findings from this audit support this where most of the patients that got help with oral antihistamine were from the mild intermittent AR group [15]. Patients with more severe symptoms, moderate-severe or those who have mild symptoms and require step up of their treatment to control an exacerbation require more than first generation oral antihistamine [15]. Two studies resulted in their patient population requiring more oral antihistamine to control symptoms [15,21]. Sanchez and Castro., *et al.* [25] included 314 patients treated with 2nd generation oral antihistamines and intranasal corticosteroids or a combination of both and 75% of the patients in this study responded to the oral antihistamine, 2nd generation, cetirizine, and loratadine. A similar trend was noted in this clinical audit where 9% of the 12% of the patients that self-medicated with second generation oral antihistamine had symptom improvement, this is a 73% improvement in symptoms. Further, Sanchez and Castro [25] highlighted the importance of oral antihistamines in the management of AR and noted the 2nd generation antihistamines are preferred to the 1st generation in not only managing symptoms but produce less sedating side effect along with dry mouth, urinary retention, constipation, or tachycardia [18,26]. These side effects if present can add to a further reduced QoL of AR patients [27,28]. BSACI evidence-based guideline recommended the use of oral antihistamine or intranasal antihistamine for mild intermittent and mild persistent AR [15]. Unfortunately, this study patient population, when compared to the BSACI guidelines, a treatment gap was identified at moderate-severe AR treatment along with step up/step down of treatment at all stage in managing an exacerbation or to achieve maintenance. This gap highlighted that study patient population were not receiving the recommended treatment [24].

INC

INC was reported superior to oral antihistamines in the management of AR, especially with those presenting with nasal obstruction [25]. 73% of the patients from this audit reported no significant improvement in symptoms. Most of the patients were staged at the extreme end of the spectrum. 48% of these with moderate-severe symptoms, 38% with mild but persistent symptoms. According to BSACI evidence-based guidelines, these patients with moderate-severe symptoms benefit more with INC, add on of oral antihistamine or intranasal antihistamine for symptom control [15]. The patients from this audit study did not receive this. The study however noted about one-third (35%) of the patients self-medicated with changing their 1st generation oral antihistamine or 2nd generation antihistamine loratadine and cetirizine or add on this to the oral antihistamine they were using (chlorphenamine). And/or use a combination of oral prednisone, INC, and herbal treatment. Of the 35% that self-medicated, 90% had symptom resolution. These patients who self-medicated did not use the add-on medication in the stepwise manner as described in the BSACI evidence-based guidelines yet demonstrated improvement in AR symptoms. Thus, this cohort of patients clearly highlighted that patients were getting suboptimal treatment and with optimal treatment they will improve and better health outcomes.

Allergen education and awareness

Allergen education/awareness is the non-pharmacologic arm to the management of AR. Identification of allergens by history and supported by SPT or sIgE is important in controlling symptoms, their frequency, and severity of AR exacerbation. Allergen education

accompanied by an action plan focused on allergen avoidance or mitigation strategies at home/work/educational institution and steps to follow when an exacerbation occur are cornerstone in the management and control of AR [15,18,29]. This audit study found that only 15% of the patients with AR has an education session done. This was however a talk and does not include an allergy diary and an action plan to manage an exacerbation or lifestyle changes. Allergen education and awareness were inefficient and accounted for poor control of symptoms leading to missed days from work or school and unplanned visits to the doctor. Kuna., *et al.* [26] noted similar characteristics of AR impact the patient's quality of life, work or school absenteeism, reduced productivity, and health care cost. Moreover, AR had attached to it a significant burden of a direct and indirect healthcare cost to both the patients/caregiver and the healthcare system [15,21]. Education and awareness extend beyond allergen education and include being able to identify an exacerbation of AR and use the action plan given, education on how to use nasal spray/drops, sinus douche, and adherence of medication. This clinical audit showed that only 26% of the patients had adherence to medication, this is low adherence which is consistent with another study done by Begum., *et al.* [30] that showed 19% adherence rate to AR medication. Adherence, according to Singh., *et al.* [31] is divided into three phases, initiation, implementation, and discontinuation phases and refers to patient taking their medication in accordance to how it was prescribed. Several factors can account for poor adherence however, lack of education on knowing the reason behind taking a medication, how to take it, and side effects are among the leading contributing factors for poor adherence in AR patients [31]. Since education and awareness on allergen avoidance, medication use etc. were not fully comprehended by the patients, it accounts for poor adherence and thus poor patient outcomes [31] which this study found almost half of its patients to be in the moderate-severe category. It is also important to control AR symptoms to have control of Asthma symptoms [18].

Quality of life

AR has a psychologic impact on patient's mental health and quality of life [18,27,28]. The findings from this audit were similar to another study done in Western Iran on the impact of AR on the quality of life which showed that patient's sleep is affected significantly. 28% of the patients from this study cannot breathe comfortable because of nasal obstruction which leads to the inability to sleep comfortable and a general feeling of discomfort/lethargy. Poor sleep can alter mood, poor concentration, reduced reaction time, stress (mood abnormality) and anxiety [18,28]. Recurrent exacerbation (40% of the patients from this audit study) led to miss days from work or school and this combine with the other factors of reduced concentration (2%), altered mood (4%) and anxiety (8%) can lead to poor performance at work and school. Not to mention the long-term health risk that sleep deprivation can cause obesity, hypertension, diabetes, cerebral vascular accident, depression among others [32].

Social issues were seen in 9% of the patients in this study where people avoid mingling with them due to rhinorrhea, having messy tissue around, or thinking they are also having a flu and is probably contagious. This can lead to social isolation thus worsening QoL [33].

GAPS in AR Management

The gaps in AR management include the lack of allergen education and awareness, no use of an action plan and allergy diary to monitor symptoms and exacerbations, and inefficient evidence-based treatment. These gaps can be eliminated, and the desired service goal can be achieved by incorporating the BSACI evidence-based guidelines [15].

Implications for the study

- Assess AR management and compare it to BSACI guidelines.
- To combine the management of asthma and AR in one clinic for patient benefit.
- With holistic management of the airway there should be less exacerbation of asthma and AR [24]
- To reduce the burden and improve the quality of life and patient outcomes associated with AR [24]
- Reduction in healthcare costs [24,34,35].

These long-term outcomes can be achieved with improved management and informed by evidence-based practices for AR [24]. The goal is to reduce healthcare costs and for patients to have fewer exacerbations, fewer ER or unplanned clinic visits, and empowered people using self-management education. The person diagnosed with AR will be able to implement an allergen trigger mitigation strategy to prevent an AR exacerbation.

Taking this project forward will be to follow BSACI evidence-based AR management, and to do a research study in 1 year to highlight the outcome benefits of following an evidence-based base management guideline for AR management.

Limitations

- This is a database audit and there are limitations associated with this type of study.
- The results from the service audit are not generalizable to other studies.
- This study only reflects the main referral clinic and does not give the overall picture of AR in Guyana.
- Data was not available to analyze absolute healthcare cost associated with AR. Thus, it is inferred from the literature review.

Recommendations

- The develop of an evidence-based guideline for the management of AR.
- Establish an AR clinic that will co-manage patients diagnosed with AR and asthma.
- Educate and train staff about AR and asthma diagnosis and management.
- Develop diagnostic capability for allergy testing.
- Have the different treatment modalities available to treat patients base on the stage of their AR.
- Repeat this clinical audit in 1 year to learn if the management of AR meets the service goal.

Conclusion

It can be concluded that AR was a significant health burden that was not optimally treated or managed when compared to BSACI evidence-based guidelines thus indicated that this clinical audit did not meet its service goal. This audit study found the current AR management did not follow the BSACI evidence-based guidelines, except in the diagnostic criteria. Reduced exacerbations, and improved symptom control and quality of life would require significant investment in education and training using the BSACI evidence-based guideline.

Dissemination Strategy

- Present the findings to hospital administration to implement an education program about the diagnosis and management of allergic rhinitis.
- Have the BSACI guideline approved by the Medical Advisory Committee (MAC) to ensure universal use of the same guidelines by all the doctors managing AR.
- Present the findings of this clinical audit at the country's annual medical scientific conference. This conference invites all the doctors, nurses and other healthcare professionals. Presenting the findings will inform everyone especially those involved at the community level about the BSACI evidence-based guideline to manage AR.
- Present the findings at the American Academy of Allergy Asthma and Immunology (AAAAI) congress and other international conferences. GPHC and the Ministry of Health, Guyana has an affiliation with AAAAI thus sponsorship to present at the congress will be approved and the dissemination of the content presented at the congress will be available to healthcare professionals worldwide.
- Sumit the study for publication to the Journal of Allergy and Clinical Immunology, World Allergy Organization Journal, Allergy – Willey Online Library, Allergy, Asthma and Clinical Immunology among others so the findings are not only reserved within Guyana but disseminated worldwide and can assist other countries or healthcare professional and guide management. These journals are easy to access, widely available, free, and provide the entire paper to researchers.

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