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ASTHMA COMMENTARY

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MESSAGES

Dr. Earl Louis Sempio

I am honored to contribute to this momentous occasion, as we celebrate the successful culmination of IRF 2022 and the publication of its commentaries in the Journal of Pakistan Medical Association. This gathering of brilliant minds and the subsequent collaboration has undoubtedly propelled our understanding of respiratory diseases, particularly asthma, to new heights.

Asthma, a chronic respiratory condition affecting millions worldwide, continues to pose significant challenges in patient management and care. Through the exchange of cutting-edge research, clinical insights, and collaborative efforts during IRF 2022, we have advanced our knowledge and forged new pathways towards enhancing the lives of asthma patients.

The discussions and deliberations at the conference have emphasized the importance of personalized treatment approaches, tailored to the unique characteristics of each patient.

I extend my gratitude to all my fellow attendees, whose expertise and tireless dedication have enriched this comprehensive supplement. Together, we have laid the foundation for future breakthroughs in asthma research and patient care. I am confident that the collective efforts of our community will continue to drive progress, ultimately leading to improved outcomes and a better quality of life for individuals with asthma.

Once again, my heartfelt appreciation goes out to everyone involved in the success of IRF 2022, and I look forward to witnessing the impact of our collective endeavors in the years to come.

MESSAGES

Dr. Saleem uz Zaman Adhami

It gives me great pleasure to share my thoughts and experiences through this platform. IRF 2022 held in Vietnam was a wonderful experience, providing doctors from different countries the opportunity to interact and share their knowledge and experiences. It was indeed interesting to note that the experience of dealing with asthma in different countries is quite similar. There is a taboo attached to the disease and hence the difficulty in accepting the diagnosis. There is also a problem with prescribing inhalers as patients are reluctant to use them. Once they do get better, they stop taking the treatment altogether instead of taking the preventive therapy. One of the reasons for this may be the cost of treatment.

All in all, we agreed while developing the consensus shared in these commentaries via polls that there is a problem firstly in convincing the patient that they have asthma; and once that is done, there is difficulty in making them take appropriate treatment; and finally, to convince the patients to continue with preventive therapy. As mentioned before, these problems are similar in the group of countries which were represented.

During our interaction, we also agreed to work harder to stick to the guidelines and help educate our patient population to get better results. Getz Pharma has always been at the forefront of providing educational material to doctors and patients. My thanks to Getz for providing us with this learning opportunity.

MESSAGES

Dr. Saw Win

Asthma is the most common chronic respiratory disease in children. The prevalence of asthma in the children of Myanmar is around 9 % of 10 -14 years old school children. With the increasing understanding of the pathophysiology of asthma and long-term controller therapy, we can make most of the children with asthma lead a normal life. But there are still many challenges to overcome especially in low and low-middle-income countries. The high costs of inhaler devices and medications are one of the challenges. In addition, inadequate knowledge and skills of health care providers treating asthma and lack of public awareness are common problems leading to the suboptimal management of asthma in children as well as adults.

It was a great privilege for me to attend and participate as a Faculty member of The International Respiratory Forum 2022 (IRF 2022) in Ho Chi Minh City, Vietnam. I was also appointed as a panelist in the Asthma symposium. A survey was conducted using a predesigned structured questionnaire about the challenges faced by each stakeholder (patients, family/caretakers, healthcare professionals, and healthcare policymakers) for Asthma management. We exchanged valuable information regarding the challenges of asthma management in both adults and children. The publication of the findings from IRF 2022 will contribute to solving the challenges in various aspects of Asthma management.

I would like to express my sincere and utmost gratitude to Getz Pharma and its entire team for efficient administrative support in organizing the IRF 2022 and these valuable publications.

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COMMENTARY NO. 1

Challenges to Asthma Management

Abstract

Despite significant advancements in our understanding of the disease process, the increased morbidity and mortality from asthma may be due in part to inadequate attention being paid to the management of the condition and approaches to improve bronchial asthma control. Data about the difficulties encountered in managing asthma in Low-middle income countries (LMIC) is scarce. The authors aimed to evaluate the challenges faced by each stakeholder in Asthma management. The International Respiratory Forum Conference 2022 commenced in Ho Chi Minh City, Vietnam, including 140 pulmonologists from 11 countries. A survey was conducted using a predesigned structured questionnaire about the challenges faced by each stakeholder (patients, family/caretakers, healthcare professionals, and healthcare policymakers) for Asthma management. Four groups were formed, physicians were randomly divided, and only one section of the questionnaire was distributed among the physicians of each group. Per the physician's perception regarding challenges faced by patients for asthma management, awareness about how to administer the dose or have poor inhaler techniques is usually still being determined. More than 50% believed that there is a need for additional patient education about the day-to-day management of their disease. The cost of therapy was considered the significant barrier faced by the family/caretakers affecting drug adherence. The frequently reported challenge from the physician's end was poor technique use because of poor asthma disease education followed by hurried communication by health care providers to the patients. Around 53% of pulmonologists from the policy maker group reported that the lack of access to affordable quality-assured inhaled medications was the major avoidable barrier that needs to be tackled on the highest priority by the policymakers. This survey has gauged the influence of personal, social, and clinical factors on asthma management and pointed out the gaps regarding adherence from patients' and health professionals' perspectives. The resolutions and inputs suggested providing a practical framework for patient-centered care that treats asthma as an inflammatory disorder and education promoting treatment compliance.

Keywords: Asthma Management, Challenges, Developing Countries

Introduction

Asthma is a common lung disease characterized by recurring respiratory symptoms of cough, wheezing and dyspnoea due to widespread narrowing of the airways. Asthma affects over 334 million people worldwide, making it one of the most prevalent diseases globally[1]. In many cases, asthma is severe and restricts a person's quality of life. Patients with asthma commonly experience increased airflow resistance with air pollution, and decreased humidity[2]. A variety of factors, including dust, tobacco smoke, and allergic reactions, can exacerbate an asthmatic patient's illness and create potentially fatal circumstances. The difficulties in treating an asthmatic patient are numerous[3]. Examination of the age-standardized deaths per million population published in the Global Asthma Report shows most of the deaths occur in low- and middle- income countries (LMIC). Many asthmatic children, adolescents and adults in LMICs lack access to effective and affordable asthma treatment[4].

Firstly the, patients with asthma need to understand how to manage their disease. The basics of treatment include identifying triggers, avoiding triggers, and taking medications as prescribed by a doctor[5]. However, educational interventions must reinforce these treatment strategies in patients' minds. Additional education about their disease is necessary as people with asthma are at an increased risk of fatal complications from asthma attacks. In addition, educating family members about how to help the asthmatic person reduces stress for both parties and promotes better outcomes for the patient[6].

Patient education is also mandatory when discussing proper inhaler techniques with patients. Inhaler technique refers to how a person coordinates breathing to deliver medication into the lungs. Proper timing of exhalation and inhalation is needed to have safe and efficient delivery of active agents. Furthermore, not all asthmatics use the same technique for their medication; family members need to know how to help a patient who is having difficulty in using their inhaler properly[7].

Lastly, patients must understand that resolution of symptoms does not equate to complete resolution of a disease course. Infections requiring antibiotics may trigger asthma which can be separately treated with bronchodilators. The sense of well-being with

bronchodilator relief should not be a reason to discontinue antibiotic treatment as it may result into antibiotic resistance[8].

Managing an asthmatic patient is difficult since they're at high risk for poor health outcomes if managed improperly. Additional patient education about the day-to-day management of their disease is necessary since many patients have no idea how to treat or prevent an asthmatic attack. Further family education is needed since there's rarely one solution for helping an asthmatic patient with family members who have yet to experience dealing with an asthmatic relative. At its core, managing someone with asthma requires a team effort; however, if everyone knows what they're doing, treatment is much easier[9]. Gauging the challenges faced by each stakeholder for Asthma management, including the patients, their family/caretakers, Healthcare professionals, and Healthcare policymakers and organizations, is vital. This survey's purpose was to highlight the gaps and the possible suggestion to overcome challenges.

Methodology

A survey was conducted during the International Respiratory Forum conference 2022 in Ho Chi Minh City, Vietnam. A total of 140 pulmonologists from 11 countries participated in the study. A predesigned structured questionnaire was developed on challenges faced by each stakeholder for Asthma management, namely the patients, the family/caretakers, Healthcare professionals, and Healthcare policymakers & organizations.

Verbal consent was obtained, study participants were randomly divided into four groups, and only one section of the questionnaire was distributed among the participants of each group. The questions and their options in each questionnaire addressed the documented key challenges of disease management and their possible solutions relevant to the assigned stakeholder group. The participants of each group were supposed to vote on the most relevant options as per their clinical experience.

For statistical treatment, the data analysis was conducted using SPSS Version 22.0. The quantitative data were presented as frequencies and percentages. SLIDO software[10] was used to present the survey results at the end of the conference.

Results

With respect to the patients, the most prevalent factor among barriers to controlling asthma was poor adherence to the treatment plan and recommended lifestyle changes. Lack of awareness about how to administer the dose or poor inhaler techniques was also commonly observed among patients by the participants (63%). Among the challenges faced by family or caretakers, the high cost and affordability issues of essential asthma medications were a major struggle. Furthermore, 77% of participants reported specifically to the Physicians category that Allergic rhinitis coexisted with asthma and complicated the diagnosis mostly. The frequently reported challenge from the physician's end was poor technique use because of poor asthma disease education followed by hurried communication by health care providers to the patients. Around 53% of participants from the policy maker group reported that the lack of access to affordable quality-assured inhaled medications was the major avoidable barrier that needs to be tackled on the highest priority by the policymakers. Disease education programmes for patients, physicians, and caretakers were considered the most effective modes of prevention implemented by the healthcare systems across the community to decrease the prevalence and mortality related to asthma.

Discussion

Poor adherence to the treatment plan and recommended lifestyle changes, lack of awareness about how to administer the dose or have poor inhaler techniques, lack of patient education, and treatment adherence were considered as the most prevalent challenges by the participants of asthma patients group. Regular exercise to improve lung function and avoiding smoking/pollution in daily life were suggested as essential lifestyle modifications that can help improve the quality of life of Asthmatic patients. The course of asthma is not solely influenced by pulmonary function or other biological factors[11]. Subjective perceptions of chronic illnesses may impact patients' adherence to therapy regimens. Considering the patients' understanding when offering medical advice and/or treatment is one of the difficulties health professionals encounter in boosting adherence.

The essential task of early detection and management of uncontrolled asthma falls on primary care clinicians[12]. This emphasizes the requirement for better instructions from the primary care physicians to help manage severe or challenging asthma and specific information regarding when patients should be sent for respiratory physician assessment. The current survey helped us to get an idea of how primary care doctors can help with the overall management of clinical conditions with the assistance of specialists. Poor use of medication devices and hurried communication by healthcare providers due to patient

Table 1: Responses obtained from the healthcare providers for Asthma management.

Questions	Responses	%
Patients		
What is the most prevalent factor, according to patients, among barriers to controlling asthma?	Cultural, psychosocial, and emotional beliefs and constraints about asthma and asthma medications	21
	Complex treatment regimens are difficult to follow	24
	Poor adherence to the treatment plan and recommended lifestyle changes	48
	Inability to understand the complexity, and severity of disease and its complications	31
There is usually uncertainty about asthma management among patients using inhalers. What may be the most valid reasons?	Social stigma and myths revolving around the use of inhalers only as an emergency medication for symptom relief and not as a regular maintenance treatment	23
	Patients prefer discrete oral treatment over inhalers	40
	Lack of awareness about how to administer the dose or to have poor inhaler techniques	63
	Fear of any potential unknown long-term side effects of the inhaler treatment or the disease itself	40
What is the most needed measure by the patients for managing asthma?	A need for additional patient education about the day-to-day management of their disease	53
	Psychological and social support for patients suffering from Asthma	23
	Better self-management behaviours and required change	33
	Adherence to therapy; better compliance (maintenance therapy and less reliever use)	50
What are the essential lifestyle modifications that can help improve the quality of life of Asthmatic patients?	Regular exercise to improve lung function	67
	Avoiding active or passive smoking and other pollutions in daily life	67
	Good organic and nutritious diet to boost the immunity	37
	Ensure hygiene and always avoid the triggers with active preventive measures	50
Family & Caretakers		
What are the struggles in managing asthma in children?	Identifying the potential triggers which can irritate the airways	47
	Delay is due to families; often waiting too long to start the treatment, which allows progressive damage to take place	56
	Overwhelming for many families to witness their patients requiring regular usage of controller medications like inhalers	50
	High-cost and affordability issues of essential asthma medications	62
The common challenges of caretakers and families of old and young dependent asthma patients are	Time management and work-life balance due to constant care required	50
	Financial constraints due to prolonged treatment of their patients	79
	Emotional and physical stress due to constant precautions	47
	Fear of finding the disease in other family members too	38
What essential measures should the caretakers of Asthmatic patients always take?	Keep the triggers away and ensure good air quality around their patients	68
	Getting their patients vaccinated for the frequent respiratory infections that can aggravate the symptoms of Asthma	47
	Must not seek immediate drastic changes; only consult the primary physician in case the therapy does not seem to work or the disease is worsening instead of attempting some infamous domestic/household remedies	44
	Must not ignore daily symptoms and/or avoid the regular medication usage	62
What are the most important guidelines that physicians should always convey appropriately to the caregivers of dependent asthmatic patients?	Correct use of relievers as soon as the flare-up occurs	71
	Existing co-morbidities that can aggravate the symptoms of asthma and vice versa	65
	Importance of identifying and avoiding the triggers	82
	Possible consequences if Asthma exacerbations become too frequent and educating them about the newer, safer treatment options.	71
Physicians		
Which of the following most commonly coexist with asthma and complicate the diagnosis?	Gastroesophageal reflux disease (GERD)	26
	Concomitant Obstructive sleep apnoea (OSA) & Obesity	13
	Allergic rhinitis	77
	COPD	19
	Bronchiectasis	6

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What are the challenges of asthma management? Choose as many as possible	Hurried communication by health care providers to the patients and lack of understanding of the patients	68
	Lack of expertise in the interpretation of key diagnostic pulmonary tests like spirometry	48
	The poor technique used for medication devices, especially inhalational drugs, because of poor means of asthma disease education	84
	Lack of awareness and implementation of National/hospital protocol or guidelines for treating Asthma (Know-do gaps)	65
HCPs spend less time considering and discussing the perceptions of each patient about their asthma because:	History and examination are usually non-specific	33
	Patient over-load	68
	Shortage of time	61
	Diagnose based on experience	16
Policymakers & Organizations		
96% of asthma deaths are in low and middle-income countries (LMIC), which are mainly due to some avoidable barriers. Which among these are needed to be addressed on the highest priority?	Lack of measures by the healthcare policymakers toward disease education	47
	Prioritization of acute care over chronic care and prevention by health systems	15
	Lack of access to affordable quality-assured inhaled medications	53
	Over-use of oral corticosteroids by physicians due to age-old practices and unawareness of newer treatment options	29
How can healthcare authorities and institutions ensure successful inhaler technique education across the community?	Asthma educators to be present at pulmonology clinics	21
	Empower pharmacists to educate and train patients	38
	Patient awareness material to be made widely and easily accessible	68
	Innovation in devices to make them user friendly	29
What urgent measures can be immediately taken in low-middle-income countries to combat the surge of poor disease management outcomes in Asthmatic patients?	Healthcare authorities must emphasize generating quality local data to better understand the local disease landscape and identify the specific challenges in the local communities	41
	Access to novel therapies like formoterol budesonide should be made easy, affordable, and vast by all the concerned healthcare authorities and stakeholders	15
	Local consensus guidelines should be widely disseminated, and the governing medical societies must ensure their implementation	21
	Disease education programmes and myth debunking sessions should be frequently carried out with the patients and their caretakers to avoid poor compliance of the patients and prepare their caretakers to handle any emergency asthma exacerbation	59
What are the most effective modes of prevention to be implemented by the healthcare systems across the community to decrease the prevalence and mortality related to asthma?	Educate the patients and their caretakers about identifying and avoiding the triggers	79
	Influenza and COVID Vaccination (Mass immunization to prevent complicating asthma)	32
	Inclusion of allergy shots/Biologics (immunotherapy) to be added in the treatment protocol by the healthcare authorities	12
	Take active measures to reduce environmental pollution and improve air quality	44

overload imposed a greater challenge in asthma management. Moreover, repeated exacerbations due to avoidance and/or reluctance towards maintenance therapies by the patients were considered the biggest concern when deciding the treatment regimen for asthma management.

Most asthma patients are treated in primary care, and general practitioners (GPs) are essential in diagnosing, treating, and early referral of patients with severe asthma. A treatment plan that takes a multifaceted approach to treat severe asthma may lessen exacerbations and improve patients' symptoms and quality of life. There is room for improvement in the coordination of community access to allied health input, treating risk factors and co-morbidities, and administering biological medicines for severe asthma, among other areas. To simplify and standardize referral and discharge processes for severe asthma, more work still needs to be done[13-17].

Considering the challenges faced by family and caretakers, in the physicians' opinion, financial constraints and affordability issues were the common struggles. It was highly recommended that the caretakers always ensure good air quality around their patients and try to keep the triggers away from the asthmatic patients. In Asia, the entire financial cost of asthma varies. The decrease of asthma-related morbidity, particularly in the more severe category, should be the top focus for areas that successfully implement universal ICS usage to attain

relatively low asthma mortality rates[18]. Early detection, referral to specialized facilities for treatment optimization in the severe asthma population, development of capacity for diagnostic improvement, and improved access to biologics and other expensive medicines are required. Collaboration across disciplines and public-private partnerships are necessary for this.

The lack of affordable quality-assured inhaled medications and accessibility of the patient awareness material was the major avoidable barrier that the policymakers needed to tackle on the highest priority. Hence patient education remains the most effective mode of prevention to be implemented by the healthcare systems across the community to decrease the morbidity and mortality related to asthma. Effective patient and physician education initiatives can be a solid connection between medical management and health education. Instead of replacing medical treatment, these activities have proven to supplement it. Such programmes have been created to fill the gap between patients and doctors and create a productive working relationship that will support superior medical care and improve family management abilities[18,19 19,20]. The share of morbidity and mortality attributed to chronic lung illnesses is rising as the affected population lives longer. Supporting proactive management, which includes giving an accurate diagnosis and a stable supply of cost-effective medications at an affordable price, is essential for the successful management of asthma. Many persons with chronic non-communicable lung diseases do not receive adequate treatment due to the lack of such infrastructure in many nations and the market failure that makes medications generally more expensive in low-resource locations. This has negative economic repercussions.

We still need to learn more about the factors contributing to the limited utilization of necessary respiratory medications in low-income settings. The use and availability of efficient treatments could be increased by systematically identifying and resolving these issues. This inquiry revealed significant issues with diagnosing asthma and managing it, as well as data collection, policymaking, patient knowledge, and medical attitudes. According to the study, policymakers, HCPs, and patients should address globally adaptable management methods from various angles. Therefore, it is crucial to give patients and HCPs pertinent education. The guidelines must strongly emphasize the fundamentals of initial evaluation, diagnosis, treatment plan, regular evaluation of patient progress, and adherence to newly proposed reforms.

Conclusion

This survey has gauged the influence of personal, social, and clinical factors on asthma management and pointed out the gaps regarding adherence from patients' and health professionals' perspectives. Further research must identify the associations between religious beliefs, control beliefs, illness knowledge, and medication adherence. If the suggested propositions can be fully merged into local practice, doctors can maintain effective care while lowering avoidable exacerbations and pointless burdens. The suggested resolutions provide an effective framework for patient-centered care that treats asthma as an inflammatory disorder and promotes patient compliance.

Acknowledgment: The authors would like to acknowledge the Medical Affairs department of Getz Pharma for their technical support and assistance in the publication process.
Disclaimer: None.
Conflict of Interest: None.
Source of Funding: None.

References

1. Network GA. The Global Asthma Report, Auckland, New Zealand.
2. Iqbal M, Khan SF, Khan S, Ahmad W. Fungal Infection Exacerbate Nasal Polyposis: A study conducted at KGN Teaching Hospital Bannu-KPK. IJEHSR. 2021;9:170-175.
3. Dharmage SC, Perret JL, Custovic A. Epidemiology of asthma in children and adults. Frontiers in pediatrics. 2019;7:246.
4. Mortimer K, Reddel HK, Pitrez PM, Bateman ED. Asthma management in low and middle income countries: case for change. Eur. Respir. J. 2022;60. : 2103179 DOI: 10.1183/13993003.03179-2021
5. Huang K, Yang T, Xu J, Yang L, Zhao J, Zhang X, Bai C, Kang J, Ran P, Shen H, Wen F. Prevalence, risk factors, and management of asthma in China: a national cross-sectional study. The Lancet. 2019;394:407-18.
6. Stern J, Pier J, Litonjua AA. Asthma epidemiology and risk factors. InSeminars in immunopathology 2020;42:5-15. Springer Berlin Heidelberg.
7. Postma DS, Kerstjens HA, Ten Hacken NH. Asthma: Epidemiology and risk factors. Clinical Respiratory Medicine. 2004:457-65.
8. Skloot GS, Busse PJ, Braman SS, et al. An Official American Thoracic Society Workshop report: evaluation and management of asthma in the elderly. Ann Am Thorac Soc 2016;13:2064–77
9. Suruki RY, Daugherty JB, Boudiaf N, Albers FC. The frequency of asthma exacerbations and healthcare utilization in patients with asthma from the UK and USA. BMC Pulm Med. 2017; 17: 74.
10. Slido. (n.d.). Slido: Live Q&A, Polls & Networking for Virtual and Hybrid Events. Retrieved from https://www.slido.com/?experience_id=17-a. Cited on 01. June 2023
11. Kaptein AA, Klok T, Moss-Morris R, Brand PL. Illness perceptions: impact on self-management and control in asthma. Current opinion in allergy and clinical immunology. 2010;10:194-9.
12. Wu TD, Brigham EP, McCormack MC. Asthma in the primary care setting. Medical Clinics. 2019;103:435-52.
13. Cruz ÁA, Stelmach R, Ponte EV. Asthma prevalence and severity in

low-resource communities. Current opinion in allergy and clinical immunology.2017;17:188-93.
14. Nunes C, Pereira AM, Morais-Almeida M. Asthma costs and social impact. Asthma research and practice. 2017;3:1-1.
15. Akinbami LJ, Salo PM, Cloutier MM, Wilkerson JC, Elward KS, Mazurek JM, Williams S, Zeldin DC. Primary care clinician adherence with asthma guidelines: the National Asthma Survey of Physicians. Journal of Asthma. 2020;57:543-55.
16. Hains I, Meyers J, Sterling K, Yoo J, Reddel H, Weston C. Difficult-to-treat and severe asthma in general practice: delivery and evaluation of an educational program. BMC family practice. 2019;20:1-8.
17. Humbert M, Bourdin A, Papadopoulos NG, Holgate ST, Hanania NA, Halpin DM, Chapman KR, Gavornikova M, Price DB, Kaplan A, Heaney LG. Reducing the hidden burden of severe asthma: recognition and referrals from primary practice. Journal of Asthma. 2021;58:849-54.
18. Ebmeier S, Thayabaran D, Braithwaite I, Bénamara C, Weatherall M, Beasley R. Trends in international asthma mortality: analysis of data from the WHO Mortality Database from 46 countries (1993-2012). Lancet 2017;390:935–45.
19. Hosny, H., Madkour, A., Hantera, M., Dahy, M., Emara, F., Ibrahim, M. and Safwat, T., Proposed Strategies to Improve Adult Asthma Management in Egypt: Expert Review and Recommendations. Annals of Global Health. 2022;88:103-.
20. MacKinnon M, To T, Ramsey C, Lemière C, Lougheed MD. Improving detection of work-related asthma: a review of gaps in awareness, reporting and knowledge translation. Allergy, Asthma & Clinical Immunology. 2020;16:1-