Editorial

Advances in the use of inhalers for asthma: What's new?

Vinod M. Thakare

Department of Pharmaceutical Quality Assurance and Pharmaceutical Analysis, Nagpur College of Pharmacy, Nagpur, Maharashtra, India

Correspondence:
Dr. Vinod M. Thakare, Nagpur College of Pharmacy, Wanadongri, Hingna Road, Nagpur - 441110, Maharashtra, India.
E-mail: vmthakre@gmail.com

How to cite this article:
Thakare VM. Advances in the use of inhalers for asthma: What's new? Innov Pharm Planet (IP-Planet) 2024;12(1):13-15.

Source of Support: Nil.
Conflicts of Interest: None declared.

Date of Submission: 22-01-2024
Date of Revision: 30-01-2024
Date of Acceptance: 02-02-2024

Asthma is a significant global health issue affecting over 330 million people worldwide. It is characterized by chronic inflammation of the airways, leading to symptoms such as wheezing, breathlessness, chest tightness, and coughing. Effective management of asthma is crucial to improve patients' quality of life and reduce morbidity and mortality associated with the disease. Inhalers play a vital role in asthma management, delivering medications directly to the lungs to control inflammation and relieve symptoms.

Recent Advancements in Inhaler Technologies

Single maintenance and reliever therapy (MART)

One of the most notable advancements in asthma management is the introduction of single MART. This approach combines both maintenance and reliever medications into a single inhaler, simplifying treatment regimens for patients. The combination typically includes an inhaled corticosteroid (ICS) and a long-acting beta-agonist, which can be used on an as-needed basis. Studies have shown that MART not only reduces asthma exacerbations but also enhances adherence to treatment by minimizing the complexity of medication regimens.[1,2]

Easyhaler® device

The Easyhaler® is another innovative inhaler that has gained attention for its user-friendly design. This metered dry powder inhaler (dmDPI) is designed to deliver a consistent dose of medication regardless of the patient's inhalation technique. Clinical trials have demonstrated significant improvements in lung function and overall disease control among users of the Easyhaler®. Its advantages include ease of use, portability, and effectiveness in real-world conditions, making it a strong candidate for the "ideal inhaler."[3]

New combination inhalers

In 2023, the Food and Drug Administration approved AIRSUPRA®, a new inhalation aerosol that combines albuterol (a short-acting beta-agonist) with budesonide (an ICS). This dual-action inhaler addresses both acute symptoms and underlying inflammation, providing a comprehensive approach to asthma management. Clinical studies indicate that AIRSUPRA® improves lung function more effectively than using either medication alone.[4,5]This innovation reflects a growing trend towards combining medications in a single device to enhance patient compliance and treatment outcomes.

Tiotropium for asthma

Tiotropium, conventionally used for chronic obstructive pulmonary disease, has also been shown to benefit asthma patients, particularly those with severe symptoms. As a long-acting muscarinic antagonist, tiotropium helps improve lung function and prolongs the time between exacerbations when used alongside standard asthma treatments.[6]

Access this article online	
Website: https://innovationaljournals.com/index.php/ip	**e-ISSN:** 2348-7275
DOI: 10.31690/ipplanet.2024.v012i01.004	

Asthma management remains a critical area of focus in respiratory health, with inhalers serving as a primary tool for delivering medication directly to the lungs. However, despite their significance, several challenges persist in the effective use of inhalers, leading to suboptimal asthma control.

Common Issues with Traditional Inhalers

Improper use

One of the most significant challenges is the improper use of inhalers. Research indicates that a substantial percentage of patients—ranging from 50% to over 80%—fail to use their inhalers correctly, which diminishes the efficacy of the medication and exacerbates asthma symptoms.[1,5] Common errors include incorrect inhalation techniques, such as failing to coordinate inhalation with actuation for metered-dose inhalers (MDIs) or not achieving the necessary inspiratory flow for DPIs.[7]

Poor adherence

Adherence to prescribed inhaler regimens is another critical issue. Studies have shown that many patients do not consistently use their inhalers as directed, which can be attributed to various factors, including forgetfulness, misunderstanding of instructions, and lack of perceived need for medication when symptoms are not present. This nonadherence often leads to increased frequency of asthma exacerbations and emergency department visits.[8]

Barriers to Optimal Asthma Control

Patient education

A lack of proper education regarding asthma management and inhaler technique is a significant barrier. Many patients report insufficient guidance from healthcare providers on how to use their inhalers effectively. This gap in education can lead to misconceptions about the importance of regular medication use and proper technique, ultimately affecting disease control.

Socioeconomic factors

Socioeconomic disparities also play a role in asthma management challenges. Minority and low-income populations are disproportionately affected by asthma and often face barriers such as limited access to healthcare resources, which can impede proper education and support for effective inhaler use. Additionally, these groups may experience higher rates of inhaler misuse due to factors like inadequate follow-up care and lack of tailored educational interventions.[9]

Complexity of treatment regimens

The complexity of treatment regimens can further complicate adherence. Patients may be prescribed multiple types of inhalers or medications, leading to confusion about how and when to use each device. This complexity increases the likelihood of errors in usage and diminishes overall treatment effectiveness.[10]

Asthma management has seen significant advancements in inhaler technology, aiming to enhance patient adherence, optimize drug delivery, and minimize environmental impact. This editorial discusses recent innovations in inhaler design, the shift towards eco-friendly options, and the challenges associated with implementing these technologies.[6]

Technological Advances in Inhaler Design

Smart inhalers

Smart inhalers represent a groundbreaking advancement in asthma management. These devices integrate sensors and mobile applications to monitor medication usage in real time. They can track the frequency and timing of inhaler use, environmental conditions such as air quality, and provide reminders for medication intake. For instance, smart inhalers like the Teva ProAir Digihaler have demonstrated effectiveness in accurately recording doses and improving patient adherence through data sharing with healthcare providers. The integration of mobile health apps allows patients to visualize their usage patterns and receive personalized feedback, thereby enhancing self-management capabilities.[11]

Improved drug delivery systems

Recent innovations have also focused on improving drug delivery systems within inhalers. Advances in particle size distribution and aerosolization techniques have led to better drug deposition in the lungs, maximizing therapeutic efficacy while minimizing side effects. Enhanced formulations are designed to ensure that a greater proportion of the medication reaches the intended site of action, improving overall asthma control.

Multi-dose inhalers

New multi-dose inhalers enable precise dosing with multiple uses, reducing waste and ensuring that patients have access to their medication over extended periods. These designs often incorporate features such as dose counters and breath-actuated mechanisms that improve usability and adherence.

Eco-friendly inhalers

The environmental impact of inhalers has become a growing concern, particularly regarding propellant-based MDIs. The transition toward DPIs represents a significant shift aimed at reducing this impact. DPIs do not require propellants, thus minimizing greenhouse gas emissions associated with traditional MDIs. Healthcare providers play a crucial role in promoting these eco-friendly options by educating patients about their benefits and encouraging their adoption.[8]

Patient-centered innovations

Innovations in inhaler design are increasingly focusing on patient-centered approaches. Devices tailored for children and elderly populations prioritize ease of use, ensuring that all patients can effectively manage their asthma. In addition, customized inhaler options that consider individual patient needs – such as specific triggers or coexisting conditions – are becoming more prevalent.[12]

Clinical Evidence Supporting New Inhalers

Recent studies have highlighted the efficacy of advanced inhaler technologies compared to traditional devices. Research indicates that smart inhalers can significantly improve patient outcomes by facilitating better adherence and providing actionable insights into medication use patterns. Comparisons show that these new technologies lead to improved asthma control and reduced healthcare utilization due to fewer exacerbations.[5]

Challenges in implementation

Despite these advancements, several challenges remain in the widespread adoption of new inhaler technologies. Cost considerations are significant; many innovative devices are priced higher than traditional options, which may limit accessibility for some patients. In addition, effective patient education is essential for ensuring the proper use of these advanced devices. Regulatory hurdles also pose challenges for market adoption, as new products must undergo rigorous testing and approval processes before reaching consumers.[6]

Future directions

Looking ahead, there is potential for personalized medicine in asthma management through advanced inhaler devices that leverage artificial intelligence and data analytics. These technologies could further optimize inhaler usage by analyzing individual patient data to tailor treatment plans effectively.[7]

Conclusion

The landscape of asthma management continues to evolve with these advancements in inhaler technology. The introduction of MART, user-friendly devices like Easyhaler®, and innovative combination inhalers such as AIRSUPRA® represent significant strides toward improving patient adherence and outcomes in asthma care. As research progresses, these developments will likely lead to even more effective strategies for managing this chronic condition, ultimately enhancing the quality of life for millions affected by asthma globally.

Addressing the challenges associated with inhaler use is essential for improving asthma management. Enhancing patient education, simplifying treatment regimens, and addressing socioeconomic barriers are crucial steps in promoting better adherence and optimal asthma control. Future strategies should focus on comprehensive educational programs that empower patients with the knowledge and skills necessary for effective inhaler use, ultimately leading to improved health outcomes for individuals living with asthma.

The advancements in inhaler technology represent a promising evolution in asthma management. Healthcare professionals must stay informed about these developments to incorporate the latest technologies into patient care effectively. Ongoing innovation is crucial for improving the quality of life for individuals living with asthma while addressing environmental concerns associated with traditional inhalers. Embracing these changes will ultimately lead to better health outcomes and more sustainable practices within respiratory care.

References

1. Di Marco F. Today's improvement in asthma treatment: Role of MART and easyhaler. Multidiscip Respir Med 2020;15:649.
2. Holst SS, Sabedin E, Sabedin E, Vermehren C. A shift in asthma treatment according to new guidelines: An evaluation of asthma patients' attitudes towards treatment change. Int J Environ Res Public Health 2023;20:3453.
3. Witt A, Douglass JA, Harun NS. Overview of recent advancements in asthma management. Intern Med J 2022;52:1478-87.
4. Cardet JC, Papi A, Reddel HK. "As-needed" inhaled corticosteroids for patients with asthma. J Allergy Clin Immunol Pract 2023;11:726-34.
5. Mowrer JL, Tapp H, Ludden T, Kuhn L, Taylor Y, Courtlandt C, *et al*. Patients' and providers' perceptions of asthma and asthma care: A qualitative study. J Asthma 2015;52:949-56.
6. Peters SP, Busse WW. New and anticipated therapies for severe asthma. J Allergy Clin Immunol 2017;5:S15-24.
7. Volerman A, Carpenter D, Press V. What can be done to impact respiratory inhaler misuse: Exploring the problem, reasons, and solutions. Expert Rev Respir Med 2020;14:791-805.
8. Sanchis J, Corrigan C, Levy ML, Viejo JL. Inhaler devices-from theory to practice. Respir Med 2013;107:495-502.
9. Himes BE, Leszinsky L, Walsh R, Hepner H, Wu AC. Mobile health and inhaler-based monitoring devices for asthma management. J Allergy Clin Immunol Pract 2019;7:2535-43.
10. Fink JB, Rubin BK. Problems with inhaler use: A call for improved clinician and patient education. Respir Care 2005;50:1360-75.
11. Dey A, Haque KA, Nayan AA, Kibria MG. IoT based smart inhaler for context-aware service provisioning. In: 2020 2nd International Conference on Advanced Information and Communication Technology (ICAICT). United States: IEEE; 2020. p. 410-5.
12. Hakizimana A, Devani P, Gaillard EA. Current technological advancement in asthma care. Expert Rev Respir Med 2024;18:499-512.