

# Advancing Precision Asthma Management and Care

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## Introduction

The 2023 Global Initiative for Asthma (GINA) strategy report provides an essential and updated practical guide for clinicians, deeply influencing current asthma management practices. This report champions personalized asthma care, advocating for the integration of shared decision-making, proactive risk factor modification, and highly tailored pharmacotherapy based on individual patient needs. Significant updates include revised recommendations for initiating controller therapy and adjusting treatment steps according to symptom control and future risk assessments. Crucially, the document highlights the expanding and vital role of biologics in effectively managing severe asthma, alongside reinforcing the foundational importance of correct inhaler technique and consistent medication adherence for all patients [1].

To further understand advanced therapeutic options, a comprehensive review thoroughly updates the landscape of biologic therapies specifically available for severe asthma. This includes detailed discussions on their diverse mechanisms of action, demonstrated efficacy, and comprehensive safety profiles. These biologics precisely target specific inflammatory pathways, such as IgE, IL-5, IL-4R $\alpha$ , and TSLP. The article offers invaluable practical guidance on meticulous patient selection, appropriate treatment initiation, ongoing monitoring strategies, and effective approaches for managing non-responders, firmly reinforcing the ongoing evolution towards precision medicine in severe asthma care. Additionally, emerging therapeutic options are briefly explored, signaling future directions in treatment [2].

In the realm of modern care delivery, systematic reviews and meta-analyses consistently evaluate the effectiveness of digital health interventions (DHIs) in optimizing asthma management. The aggregated findings compellingly suggest that various DHIs, encompassing user-friendly mobile applications, sophisticated wearable sensors, and accessible telehealth platforms, can lead to significant improvements in asthma control, a marked reduction in exacerbation rates, and an overall enhancement in patients' quality of life. This body of work underscores the considerable potential of technology to actively facilitate effective self-management, boost medication adherence, and enable continuous remote monitoring, thereby highlighting the critical need for well-designed and rigorously validated digital tools that can be seamlessly integrated into routine clinical care pathways [3].

The scientific pursuit of precision medicine in asthma represents a transformative shift, moving decidedly beyond traditional, broad classifications to embrace phenotype-driven therapeutic strategies. This innovative approach involves the meticulous identification of distinct asthma endotypes and specific biomarkers, which collectively enable the development and application of more highly targeted treatments, especially with advanced biologic agents. The review unequivocally emphasizes the profound importance of understanding each individual patient's unique characteristics, their specific genetic predispositions, and the complex in-

terplay of environmental interactions. This comprehensive understanding is essential for optimizing treatment outcomes, minimizing potential adverse effects, and ultimately paving the way for truly personalized and effective asthma care [4].

Environmental factors, particularly air pollution, play a critical and recognized role in triggering asthma exacerbations, a topic extensively reviewed in recent literature. Research consistently highlights how diverse air pollutants contribute significantly to airway inflammation and hyperresponsiveness, directly worsening overall asthma control. Effective management strategies therefore emphasize the paramount importance of comprehensive patient education regarding air quality alerts, the implementation of personal protective measures, and the careful optimization of pharmacotherapy for individuals particularly susceptible to pollution-induced exacerbations. This multifaceted approach strongly advocates for integrated strategies that seamlessly combine robust clinical management with broader public health interventions to mitigate environmental risks [5].

The critical role of primary care in the overarching framework of asthma management is increasingly under scrutiny, with reviews outlining both current challenges and significant future opportunities. Common issues frequently encountered in primary care settings include the prevalent problems of underdiagnosis and misdiagnosis, suboptimal adherence to prescribed treatments, and often inadequate patient education. Strategies proposed to substantially improve asthma care in this setting encompass better and more consistent implementation of established guidelines, enhanced and collaborative communication channels between primary and specialist care providers, the strategic use of innovative digital tools, and ongoing, continuous professional development for primary care practitioners, all designed to optimize patient outcomes effectively [6].

Underpinning all effective asthma therapy is the critical importance of proper inhaler technique and unwavering medication adherence for achieving optimal asthma control. A narrative review meticulously details how incorrect technique and poor adherence invariably lead to inadequate drug delivery, resulting in an increased symptom burden, higher rates of exacerbations, and greater utilization of healthcare resources. The article strongly advocates for regular and systematic assessment of inhaler technique, comprehensive patient education initiatives, and the development of tailored interventions specifically designed to improve adherence. These foundational aspects are presented as absolutely essential for effective asthma management across the entire spectrum of severity levels [7].

The current body of evidence concerning dietary interventions in asthma management is also a subject of active review, exploring how specific nutrients and particular dietary patterns might influence airway inflammation and the manifestation of asthma symptoms. For instance, diets rich in omega-3 fatty acids, antioxidants, or following a Mediterranean pattern have shown some promising findings. However, the article judiciously highlights the pressing need for more robust, large-scale clinical trials to definitively establish concrete dietary recommendations for asthma

patients. It is suggested that personalized nutritional counseling could serve as a valuable complementary approach to conventional pharmacotherapy [8].

Beyond medication and diet, regular physical activity and structured exercise are consistently highlighted as playing a profoundly beneficial role in the comprehensive management of asthma. A narrative review discusses how carefully tailored exercise programs can lead to measurable improvements in lung function, a reduction in troublesome symptoms, an enhancement in overall quality of life, and a decreased reliance on rescue medication, even for individuals who experience exercise-induced bronchoconstriction. The article provides practical considerations for clinicians to effectively counsel patients on safe and appropriate exercise routines, emphasizing the critical importance of warm-up and cool-down periods, along with the judicious use of appropriate medication to facilitate active and healthy lifestyles [9].

Finally, a practical review offers a highly updated and systematic approach to the complex management of severe asthma in adults. This approach emphasizes the necessity of systematic assessment to accurately confirm diagnosis, precisely identify treatable traits, and meticulously optimize standard therapies before advancing to more specialized treatments. The article elaborates on the crucial stratification of patients based on their specific phenotypes, a process that effectively guides the selection of the most appropriate biologic therapies. It also underscores the indispensable importance of a multidisciplinary team approach, comprehensive patient education, and proactive management of comorbidities to significantly improve outcomes in this particularly challenging patient population [10].

## Description

Modern asthma management is increasingly characterized by a shift towards personalized approaches, moving beyond generalized protocols to embrace phenotype-driven therapeutic strategies [4]. The 2023 Global Initiative for Asthma (GINA) strategy report underscores this by emphasizing tailored pharmacotherapy, shared decision-making, and proactive risk factor modification. Key updates include refined recommendations for initiating controller therapy and adjusting treatment steps based on an individual's symptom control and future risk profile [1]. Understanding distinct asthma endotypes and biomarkers is crucial for enabling more targeted treatments, thus optimizing outcomes and minimizing adverse effects by considering patient-specific characteristics, genetic predispositions, and environmental interactions [4].

For patients with severe asthma, advanced therapeutic options, particularly biologic therapies, have become central to effective management. These comprehensive reviews detail the mechanisms of action, efficacy, and safety profiles of approved biologics that target specific inflammatory pathways such as IgE, IL-5, IL-4R $\alpha$ , and TSLP [2]. A practical approach to managing severe asthma in adults involves systematic assessment to confirm diagnosis, identify treatable traits, and optimize standard therapies before considering these advanced treatments. Patient stratification based on phenotypes guides the selection of appropriate biologic therapies, highlighting the importance of a multidisciplinary team, patient education, and addressing comorbidities to improve outcomes in this challenging population [10]. The move towards precision medicine in severe asthma care emphasizes careful patient selection, treatment initiation, monitoring, and strategies for managing non-responders [2].

Technological advancements are significantly enhancing asthma care, with digital health interventions (DHIs) proving effective in improving patient outcomes. Mobile apps, wearable sensors, and telehealth platforms can collectively boost asthma control, reduce exacerbations, and enhance quality of life by facilitating self-management, medication adherence, and remote monitoring [3]. Beyond

technology, lifestyle factors contribute notably to asthma management. Regular physical activity and tailored exercise programs can improve lung function, reduce symptoms, and enhance quality of life, even for individuals with exercise-induced bronchoconstriction [9]. Dietary interventions, including specific nutrients like omega-3 fatty acids and antioxidants or adherence to patterns like the Mediterranean diet, may influence airway inflammation, though further robust clinical trials are needed to establish definitive recommendations [8]. Personalized nutritional counseling can complement conventional pharmacotherapy, aligning with a holistic approach to patient care [8].

Several practical challenges and foundational elements are critical for successful asthma management. Air pollution, for instance, plays a significant role in triggering exacerbations, as various pollutants contribute to airway inflammation. Patient education on air quality alerts, personal protective measures, and optimized pharmacotherapy are essential to managing asthma in polluted environments, advocating for integrated public health and clinical strategies [5]. In primary care, issues like underdiagnosis, misdiagnosis, suboptimal treatment adherence, and inadequate patient education remain prevalent challenges. Improving asthma care in this setting requires better guideline implementation, enhanced communication between primary and specialist care, and continuous professional development [6]. Crucially, the impact of inhaler technique and medication adherence cannot be overstated; incorrect technique and poor adherence lead to inadequate drug delivery, increased symptom burden, and higher exacerbation rates, making regular assessment and tailored patient education vital for effective management across all severity levels [7].

## Conclusion

Recent advancements in asthma management emphasize personalized approaches, moving beyond traditional classifications to phenotype-driven therapeutic strategies. The 2023 Global Initiative for Asthma (GINA) strategy report highlights tailored pharmacotherapy, shared decision-making, and risk factor modification, including updated recommendations for controller therapy and the expanded role of biologics. Biologic therapies for severe asthma, targeting specific inflammatory pathways, are increasingly crucial, with ongoing developments in patient selection and management of non-responders. Precision medicine further refines this by identifying distinct asthma endotypes and biomarkers to optimize treatments, considering individual patient characteristics and environmental interactions. Beyond pharmacotherapy, digital health interventions, such as mobile apps and telehealth, show promise in improving asthma control, adherence, and quality of life through enhanced self-management and remote monitoring. Lifestyle factors like diet and exercise also play a beneficial role; tailored exercise programs can improve lung function and reduce symptoms, while specific dietary patterns might influence airway inflammation, though more research is needed for definitive recommendations. Practical considerations for effective asthma care include the critical importance of proper inhaler technique and medication adherence to prevent inadequate drug delivery and exacerbations. Air pollution significantly impacts asthma, necessitating patient education on air quality and protective measures. Furthermore, primary care plays a vital role in asthma management, facing challenges like underdiagnosis and suboptimal adherence, which can be addressed through better guideline implementation, enhanced communication with specialists, and continuous professional development.

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## Conflict of Interest

None.

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