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Perspective

Therapeutic Approaches for Managing Pediatric Asthma: Comparing Inhaled Corticosteroids and Biologics

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DESCRIPTION

Asthma is the most common chronic respiratory disease affecting children worldwide, characterized by airway inflammation, bronchial hyper responsiveness and variable airflow obstruction. In high-income countries, advances in understanding asthma pathophysiology have led to more sophisticated management strategies, aiming to reduce morbidity, prevent exacerbations and improve quality of life. The cornerstone of Pediatric asthma treatment has long been Inhaled CorticoSteroids (ICS), but in recent years, biologic therapies have emerged as promising options, particularly for children with severe or refractory asthma.

Inhaled corticosteroids remain the first-line anti-inflammatory treatment for persistent Pediatric asthma. Their mechanism centres on reducing airway inflammation by modulating multiple inflammatory pathways. ICS therapy effectively decreases asthma symptoms, reduces exacerbation frequency and improves lung function in children. The safety profile of ICS in paediatrics is generally favourable, especially when used at low to moderate doses; however, concerns about growth suppression and adrenal suppression at higher doses persist, necessitating careful dosing and monitoring. ICS are administered *via* various inhaler devices such as metered-dose inhalers or dry powder inhalers, often combined with Long-Acting Beta-Agonists (LABAs) for children with moderate to severe asthma. The efficacy of ICS has been well demonstrated in large-scale Randomized Controlled Trials (RCTs), establishing them as the backbone of Pediatric asthma management worldwide.

Despite their success, a subset of Pediatric patients experiences severe asthma that is poorly controlled despite high-dose ICS and other controller medications. This group suffers from frequent exacerbations, hospitalizations and impaired quality of life, highlighting an unmet clinical need. The heterogeneity of severe asthma has prompted investigation into targeted therapies, giving rise to the use of biologics. Biologics are monoclonal antibodies designed to inhibit specific inflammatory mediators implicated in asthma pathogenesis. In Pediatric asthma, the most commonly used biologics target immunoglobulin E (IgE) or InterLeukins (ILs) such as IL-5 or IL-4/IL-13 pathways. For example, omalizumab, an anti-IgE antibody, has been approved for children aged 6 years and older with moderate to severe allergic asthma. More recently, mepolizumab (anti-IL-5), dupilumab (anti-IL-4Rα) and benralizumab (anti-IL-5Rα) have shown efficacy in adolescents and are being evaluated in younger children.

Clinical trials and real-world studies in high-income countries have demonstrated that biologics reduce exacerbation rates, oral corticosteroid dependence and healthcare utilization in children with severe asthma. They also improve lung function and quality of life. Importantly, biologics offer a more personalized therapeutic approach by targeting the underlying inflammatory endotype rather than the broad anti-inflammatory effect of ICS. However, biologics come with limitations. The need for parenteral administration (usually subcutaneous injections) may pose adherence challenges in Pediatric patients. Their high cost and limited long-term safety data in young children raise concerns about accessibility and risk-benefit balance. Additionally, biomarker identification, such as blood eosinophil counts or Fractional Exhaled Nitric Oxide (FeNO), is necessary to select appropriate candidates, adding complexity to clinical decision-making.

Comparing ICS and biologics reveals complementary rather than competing roles. ICS remain essential for most Pediatric asthma patients due to their efficacy, safety, ease of use and lower cost. Biologics, by contrast, are reserved for severe cases where ICS and other controllers fail to achieve control. Emerging evidence suggests that early identification of severe asthma phenotypes may allow timely initiation of biologics, potentially modifying disease trajectory and reducing cumulative corticosteroid exposure. In practice, combining therapies is common, with biologics used as add-on treatments alongside ICS. This approach balances the broad anti-inflammatory benefits of ICS with the precision of biologics, maximizing control while minimizing side effects. The future of Pediatric asthma management likely lies in precision medicine, incorporating genetic, biomarker and clinical profiling to tailor therapy. Biologics represent a paradigm shift, emphasizing the

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need for individualized treatment plans. Ongoing research is focused on expanding indications, improving delivery methods and reducing costs to enhance accessibility.

CONCLUSION

Inhaled corticosteroids remain the foundational treatment for Pediatric asthma, providing effective, safe and affordable control of airway inflammation for the majority of patients. However, the advent of biologic therapies offers new hope for children with severe or refractory asthma who do not respond adequately to conventional treatment. While biologics demonstrate significant benefits by targeting specific inflammatory pathways, their high cost, need for injections and requirement for precise patient selection limit their widespread use. ICS and biologics serve complementary roles, with ICS as the primary treatment and biologics reserved for specialized cases. Optimizing Pediatric asthma management requires a nuanced approach that balances efficacy, safety, patient preferences and healthcare resources. High-income countries are well-positioned to integrate these therapies into clinical practice through multidisciplinary care and precision medicine frameworks. Future directions include refining biomarkers for better patient stratification, developing less invasive biologic delivery systems, and addressing disparities in access to advanced therapies. Through continued research and innovation, the goal remains to achieve personalized, effective asthma control for every child, improving their health outcomes and quality of life.