

# Tailored Management of Allergic Diseases by Age: One Size Does Not Fit All



Ann Chen Wu, MD, MPH<sup>a</sup>, Narmeen Rehman, BA<sup>a</sup>, and Paula Busse, MD<sup>b</sup> Boston, Mass; and New York, NY

Food allergy persistence in pediatric populations and higher rates of adult-onset allergies occur more frequently today, or at least are being more recognized, than in the past.<sup>1</sup> Not only have the rates of incidence and prevalence of asthma in children increased, but more recently they have also increased in middle-aged and older adults. Importantly, the morbidity and mortality of asthma in older adults is higher than in children.<sup>2</sup> These trends display that age can have significant implications for the pathogenesis, disease presentation, and management of allergic conditions. For this reason, achieving optimal control of these diseases can be challenging.<sup>1</sup> The differences across pediatric and adult populations suggest that both providers and patients must adapt their approaches to the management of allergic diseases based on age. From targeted therapeutics to behavioral self-management approaches, this issue of the *Journal of Allergy and Clinical Immunology: In Practice* includes articles that provide an overview of approaches to tailoring the treatment of allergic diseases (ie, food allergy, asthma, atopic dermatitis [AD], angioedema/urticaria) to ensure safe and effective disease management across the life course.

The heterogeneity of allergic conditions is due in part to complex genetic and epigenetic mechanisms that differ by developmental stage. Nomura et al<sup>3</sup> and Maurer et al<sup>4</sup> both highlight that a greater understanding of differences in endotypes, or distinct underlying molecular mechanisms, between pediatric and adult populations in AD and chronic urticaria (CU) can be useful in optimizing immunopharmacological treatments. For example, in AD, Th2 axis activation is present across all ages, but the activation of Th17/Th22/Th1 immunologic pathways diverges among age groups and ethnicity.<sup>3</sup> These pathways impact disease manifestation and

ultimately can alter the responsiveness and efficacy of certain therapeutic courses.<sup>3</sup> Given the multidimensionality of allergic diseases, a greater understanding of the subtypes and biomarkers of allergic diseases that are affected by age shows promise in improving treatment outcomes.<sup>3,4</sup> However, despite the improved characterization of certain pathways of allergic diseases, Maurer et al<sup>4</sup> suggest that there is still inadequate understanding of the clinical features and treatment of individuals whose age is outside the “traditional age range for which registered studies are performed.” In the case of CU, there was a lack of evidence on the characterization of the disease in pediatric populations.<sup>4</sup> To combat this, a global registry of patients with CU was created to collect data on demographic characteristics, triggers, comorbidities, and more, effectively working to address the knowledge gaps on CU.<sup>4</sup>

The existence of comorbid conditions can also further complicate the management of allergic diseases.<sup>2</sup> As shared by Busse et al,<sup>2</sup> comorbidities in individuals with asthma are associated with poorer outcomes and increased rates of asthma hospitalizations. Although certain difficult comorbidities are common in pediatric populations (eg, AD and food allergies), a majority of comorbidities are present within adult populations and are linked to aging.<sup>1,2</sup> Such common comorbidities include cardiovascular disease (CVD), chronic obstructive pulmonary disease, nasal polyps, and allergic rhinitis.<sup>2</sup> Treatment becomes more complicated as the existence of comorbidities requires physicians to focus on developing comprehensive approaches to treatment, especially regarding medication interactions. For example, oral corticosteroids are commonly prescribed for individuals with asthma, but can complicate CVD that is more prevalent in populations with asthma. According to one study cited by Busse et al,<sup>2</sup> minimizing medications for comorbidities within populations with asthma has been shown to improve asthma control and treatment adherence.

Adherence remains a significant barrier in achieving optimal control of allergic diseases, especially in pediatric populations where rates of adherence to asthma medications are as low as 50%.<sup>5</sup> The primary responsibility of managing allergic conditions changes throughout life: infants rely wholly on caregivers, grade-school children gain some responsibility but still depend on caregivers and school staff, and the responsibility of self-management continues to increase and transfer to the child across early-to-late adolescence.<sup>1,5</sup> Yet, challenges to self-management are not limited to only pediatric populations.<sup>2,5</sup> Factors such as low health literacy and age-related cognitive decline in older patients present barriers to self-management that persist in older populations.<sup>2</sup> According to Rehman et al,<sup>5</sup> providers play an integral role in teaching patients about their condition severity and medication use. Thus, the methods providers use to communicate with patients and caregivers

<sup>a</sup>Center for Healthcare Research in Pediatrics, Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care, Boston, Mass

<sup>b</sup>Division of Allergy and Clinical Immunology, Department of Medicine, Icahn School of Medicine at Mount Sinai School, New York, NY

No funding was received for this work.

Conflicts of interest: A. C. Wu receives funding from GlaxoSmithKline for a research study. N. Rehman declares that she has no relevant conflicts of interest. P. Busse reports personal fees, outside of the submitted work, from CSL Behring, Takada, Pharming, Pearl Therapeutics, BioCryst, CVS Health, Novartis, Astra-Zeneca, and GlaxoSmithKline.

Received for publication March 24, 2020; accepted for publication March 25, 2020.

Corresponding author: Ann Chen Wu, MD, MPH, Department of Population Medicine, 401 Park Drive, Suite 401, Boston, MA 02215-5301. E-mail: [ann.wu@childrens.harvard.edu](mailto:ann.wu@childrens.harvard.edu).

J Allergy Clin Immunol Pract 2020;8:1881-2.

2213-2198

© 2020 Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology

<https://doi.org/10.1016/j.jaip.2020.03.029>

should change according to the demographic of their patient. To address challenges in adherence, novel and efficacious self-management interventions, such as mobile health applications for older adolescents and personalized educational interventions for elderly populations, are being developed.<sup>5,6</sup>

The success of these interventions highlights that, along with pharmacological treatments, behavioral self-management interventions are successful when specific age-related factors are addressed. In an era where the use of personalized medicine is rapidly growing, expanding knowledge on underlying mechanisms affected by age for the many subsets of allergic diseases will be important in developing new, targeted immunological and pharmacological treatments. Future studies should ensure that evidence is being built from demographically heterogeneous populations to address any gaps in knowledge. Although certain study populations may fall out of the normal range of disease presentation, they still provide new insights on the fundamental pathology of allergic conditions and can provide a novel understanding on treatment approaches. To improve acceptability of treatment, interventions and self-management

tools that educate patients according to their developmental and learning levels can increase adherence. Applying a life-course approach in treatment indicates immense potential for both innovation and improvement of outcomes for patients with allergic diseases.

#### REFERENCES

1. Sicherer SH, Warren CM, Dant C, Gupta R, Nadeau K. Food allergy from infancy through adulthood. *J Allergy Clin Immunol Pract* 2020;8:1854-64.
2. Busse PJ, McDonald V, Wisnivesky J, Gibson P. Asthma across the ages: adults. *J Allergy Clin Immunol Pract* 2020;8:1828-38.
3. Nomura T, Wu J, Kabashima K, Guttman-Yasskey E. Endophenotypic variations of atopic dermatitis by age and ethnicity. *J Allergy Clin Immunol Pract* 2020;8:1840.
4. Maurer M, Saini S, Shams M, Bernstein JA. Urticaria and angioedema across the ages. *J Allergy Clin Immunol Pract* 2020;8:1866-74.
5. Rehman N, Morais-Almeida M, Wu A. Asthma across childhood: improving adherence to asthma management from early childhood to adolescence. *J Allergy Clin Immunol Pract* 2020;8:1802-7.
6. Baptist AP, Karamched KR, Carpenter L, Hao W, Song PX, Steinberg J. A self-regulation intervention can decrease asthma exacerbations among older adults. *J Allergy Clin Immunol* 2018;141:AB209.