

Do we have evidence that pediatric written asthma action plans really work?

In this issue of the *Annals*, Sunshine and colleagues¹ present data suggesting that written action plans do not improve asthma outcomes for children with persistent or poorly controlled asthma. As a result of this study, we are left wondering whether the asthma action plan—a universally recommended intervention in international and national asthma guidelines—is really a useful tool for asthma control.^{2,3}

So, should we stop using asthma action plans? There is sparse literature regarding the sole intervention of giving patients an asthma action plan and its effect on asthma outcomes. There are several studies in adults showing that they are effective as part of a multicomponent asthma self-management intervention, including asthma education, regular medical review, self-monitoring, and use of written action plans.⁴ However, there are only 2 rigorous randomized controlled trials showing benefit to independent use of written action plans on asthma outcomes in children.^{5–9} One study, conducted in India, demonstrated decreased acute care visits, missed school days, and symptoms.⁸ In the second study, conducted in Canada, emergency department physicians increased prescription of daily inhaled corticosteroids and referral for medical follow-up visits when they gave participants a written action plan. Participants, in turn, had higher adherence to daily inhaled corticosteroids, oral corticosteroid prescription fill rates, and well-controlled asthma at follow-up.⁹ This study suggests that action plans alone may serve as a reminder of good clinical practice and enhance physician adherence to asthma guidelines.⁹ In addition, perhaps they facilitate more effective interactions between physicians and families and lead to improved patient self-management.¹⁰

Why would the study by Sunshine et al fail to show a benefit in the use of asthma action plans? The study showed that self-reported use of an asthma action plan once a week or more during the prior 12 months did not improve asthma

control, quality of life, or urgent health care utilization.¹ However, the authors did not report whether health care professionals reviewed use of the asthma action plan with participants. The study does not indicate whether the plan was passively handed to participants or actively used to facilitate asthma education and self-management.¹ Clearly, this would have a major effect on the usefulness of the asthma action plan. In this study there was no comment regarding whether a standardized asthma action plan was used.¹ This is important because without clear instructions on symptom-based and/or peak flow monitoring and steps to maintain control and manage worsening asthma the plan would likely turn out not to have been a useful self-management tool. Finally, because the study does not measure how patients used the asthma action plan, we do not know whether distributing the plan changed any asthma self-management behaviors.¹

Where does this leave us when taking care of patients with asthma? The study by Sunshine et al represents an attempt to address the utility of the asthma action plan and brings our attention to important clinical questions. Given the limitations of the study and the sparse literature, further rigorous randomized controlled trials measuring the independent effect of the asthma action plan on asthma self-management and important clinical outcomes are warranted. Nonetheless, in the meantime we should adhere to our guidelines and continue to use written action plans to provide our patients with clear instructions on how to manage their asthma.

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Allergy and the bone: connections

The review by Gatti et al¹ entitled “Allergy and the Bone: Unexpected Relationships” in this issue of the *Annals* seems to fit the theory advanced in James Burke’s BBC show “Connections” that scientific progress is nonlinear and comes from a series of seemingly unconnected events that then can be connected.

The review stimulates thinking about our understanding of how the body uses mediators in multiple roles and how our treatments of one disease can affect an often unrelated organ system. Clinical medicine is full of these examples, such as finding that the antihypertensive minoxidil might benefit male pattern baldness.

There is an anabolic role of prostaglandins in bone metabolism.² Should we have long-term concerns with the CRTH2 antagonists now being studied to treat allergic rhinitis and asthma? Will there be sufficient blocking of prostaglandin D₂ activity to affect bone density?

The review also highlights the difficulty of maintaining “primum nocere” in treating patients. Active agents appear always to have unexpected side reactions. The decision now is whether the benefit is worth the risk.

The most obvious connection between bone and allergy is through vitamin D. It is beyond the scope of an editorial to thoroughly review all of the recent vitamin D information. I have included references for those who want more information.^{3–5} For this editorial, I have chosen select actions and associations that relate to allergy. I must preface my comments with the caveat that there are many confounding issues to be resolved.

One basic action of vitamin D through its biologically active form, 1,25-(OH)₂-vitamin D, and the vitamin D receptor is inhibition of dendrite cell maturation, with augmentation of interleukin (IL) 10 production while downregulating IL-11 and upregulating IL-12, which promotes a shift from the T_H1 to a T_H2 phenotype.⁶

Vitamin D supplementation of healthy human volunteers increased the percentage of T-regulatory cells by approximately 20%, when 25-hydroxy vitamin D (25-OHD) levels were doubled.⁷

Serum 25OHD levels were inversely associated with the number of positive aeroallergen skin test results and total serum IgE levels in asthmatic children. The levels were positively correlated in asthmatic children with lower forced expiratory volume in 1 second and ratio of forced expiratory volume in 1 second to forced vital capacity. The need for inhaled or systemic corticosteroids for asthma treatment increased with lower 25-OHD levels.⁵

In vitro treatment with 1,25(OH)₂-vitamin D can reverse corticosteroid resistance. In vivo vitamin D supplementary treatment of corticosteroid-resistant patients enhanced the IL-10 expression by CD4 cells.⁸

In a mouse model of allergen immunotherapy, 1,25(OH)₂-vitamin D₃ potentiated the efficacy, which was associated with increased IL-10 and transforming growth factor β .⁹

The big question is whether vitamin D deficiency and alterations in immune regulation can explain part of the documented increase in allergic disorders. In the National Health and Nutrition Examination Survey (NHANES) study, there was a near doubling of vitamin D insufficiency. From 1994 to 2004, only 25% of the current NHANES patients achieved sufficiency levels (25-OHD level greater than 30 ng/mL). The problem was greater in the minority population, with vitamin D insufficiency in more than 90%.³

Measuring 25-OHD levels should become part of our initial allergy workup, with replacement therapy for patients with insufficient or deficient levels.

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