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## 2020 Updated Asthma Guidelines: Indoor allergen reduction

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### Keywords

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The updated National Asthma Education and Prevention Program Expert Panel Working Group Guidelines<sup>1</sup> have been highly anticipated and are a useful update for clinicians who care for people with asthma. One of the selected topics the Expert Panel Report-4 (EPR-4) was charged with updating was the effectiveness of indoor allergen reduction in the management of asthma. One major shift from previous guidelines is the use of new methods for assessing the evidence and developing the recommendations. These methods include the following:

1. The Expert Panel relied on findings from a systematic review and Grading of Recommendations, Assessment, Development and Evaluations, which is an international evidence-based medicine framework for developing clinical recommendations. Because it uses established criteria to assess the strength of the recommendation and the certainty of evidence, the recommendations in the updated guidelines are accompanied by a statement about the strength of the recommendation and the certainty of the evidence. Most of the allergen intervention recommendations were considered to have low certainty of evidence, defined as “our confidence in the effect estimate is limited. The true effect may be substantially different from the estimated effect.”
2. In contrast to previous iterations of the guidelines, the Expert Panel’s recommendations were also informed by focus groups; input from stakeholder groups, including patients, caregivers, and clinicians; and public comments.
3. Evidence from studies that reported on *critical outcomes*, identified by the Expert Panel as asthma exacerbations, asthma control, and asthma-related quality of life, and that used validated outcome measures was rated more highly. The panel considered outcomes related to health care utilization to be *important*, but not *critical*, outcomes.

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4. The guidelines now define single-component and multicomponent interventions aimed at indoor allergen reduction. A single component is a strategy or method, such as air purifiers, allergen-impermeable mattress and pillow encasements, or integrated pest management. A multicomponent intervention uses multiple strategies or methods to reduce indoor allergen exposure.

The above approach informed the development of 4 key recommendations<sup>1</sup> (Table I). These recommendations, and in particular their strength and certainty, reflect the limitations of the published literature on this topic, which are highlighted by the EPR-4 in its report. The systematic review reached the same conclusion: "... the evidence base lacks sufficient high-quality studies to inform useful conclusions for the interventions evaluated. This does not indicate that the interventions are ineffective, but rather highlights the need for additional research."<sup>2</sup> Specifically, few allergen intervention trials are harmonized across population, allergen(s) targeted, intervention methods, and other features, and as a result the literature is scattershot, making it impossible to draw conclusions about the effectiveness of a particular intervention in a particular population across more than 1 study. Given that individual susceptibility to allergen exposure—even among those sensitized to the allergen—varies substantially, this is a critical limitation of the literature. A second limitation of the literature is that results from some of the trials are difficult to interpret because of study design issues (eg, no control group) and reliance on nonvalidated outcome measures. These quality issues are at least partly related to the challenges of conducting these trials (eg, need for home visits and assurance of fidelity of a complex intervention) coupled with inadequate resources to overcome these challenges.

Without a robust literature of coordinated, carefully conceived, and adequately resourced clinical trials, it is very difficult to draw meaningful conclusions. One approach to counter the challenge of heterogeneity of trials is to lump studies by a single common feature (eg, single- vs multicomponent intervention), but this approach results in substantial variability among those studies that share the single feature—the studies may target different allergens in different populations and the intervention methods used to target the same allergen may also vary. For example, a single-allergen dust mite intervention targeting a general population of adults<sup>3</sup> is quite different than one targeting children with asthma and documented dust mite sensitization.<sup>4,5</sup> The risk of reviewing "lumped" allergen intervention clinical trials is that subpopulations for whom there is more certainty regarding the efficacy of these interventions may be denied access to the interventions and support for implementing them.

The systematic review and the application of the Grading of Recommendations, Assessment, Development and Evaluations framework in the development of these guidelines also exclude evidence that is generated from observational studies, which can provide important insights into (1) whether an indoor allergen is causally related to a range of asthma outcomes, (2) whether it can be reduced by particular interventions, and (3) whether reduction of the exposure is associated with improvements in asthma. An overall evaluation of whether, and to what extent, to address a particular allergen exposure should include an assessment of the above 3 points, which are not addressed in the update to the guidelines.<sup>1</sup> As an illustration, for mouse allergen, there is good evidence supporting points 1 to 3,<sup>6-8</sup>

and from this evidence alone, it would be inappropriate to conclude that we should not address mouse infestation and exposure for a child with persistent asthma and mouse sensitization and infestation in his or her home. Certainly, it would be inappropriate to recommend that a family with limited resources spend money on an intervention with little evidence of effectiveness, but providing education and recommendations about low-cost actions that the family can take and referring to housing and legal advocacy services are warranted in this circumstance given the strong evidence that this home exposure is harming the child's health, and potentially even causing deficits in lung growth.<sup>9</sup> From a broader perspective, these updated guidelines make it clear that a different framework is needed to assess evidence in environmental interventions trials. The framework should incorporate observational data as outlined above and, as addressed in the updated guidelines, explicitly weigh the risks of the interventions (such as costs) and the potential benefits. It should also speak to both individual-level and population-level implications of the evidence. Such an approach could provide clearer guidance for clinicians, patients, and public health organizations.

A different approach to assessing and synthesizing the evidence, however, will still be limited in its impact by the quality of the data, which can only be remedied by a coordinated and adequately resourced effort to prioritize and design and execute allergen intervention studies. Indeed, the updated guidelines call for more research to assess the effectiveness of allergen mitigation interventions that use validated outcome measures and to better understand the individuals who would benefit (or not) from such interventions. Given that the effects of these environmental exposures in childhood may have long-term consequences on lung health<sup>9</sup> and that ethnic and racial minority children are most at risk for poor housing and neighborhood conditions that lead to pest infestations and mold exposure,<sup>10</sup> this group should be considered high priority. Because of the limitations of the evidence base, however, the recommendations remain largely unchanged: evaluate those with persistent asthma for allergic sensitization and exposures and provide education about reducing those exposures, including an assessment of risks and benefits. Specifically, the guidelines<sup>1</sup> provide conditional recommendations for interventions targeting pest infestation and dust mites, and for patients who cannot access allergy testing, symptom history alone is sufficient to recommend a multicomponent intervention. For patients with limited resources, engaging local public health and housing programs can be helpful for addressing pest infestation and mold. Specific recommendations for a given patient continue to be informed by a combination of a limited evidence base, clinical judgment, and shared decision making, which will account for the types of exposures, the severity of their asthma, their resources, and other circumstances.

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EPR-4 Recommendations for indoor allergen interventions

TABLE I.

Recommendation	Strength of recommendation	Certainty of evidence
In individuals with asthma who do not have sensitization to specific indoor allergens or who do not have symptoms related to exposure to specific indoor allergens, the Expert Panel conditionally recommends against allergen mitigation interventions as part of routine asthma management.	Conditional recommendation	Low certainty of evidence
In individuals with asthma who have symptoms related to exposure to identified indoor allergens, confirmed by history taking or allergy testing, the Expert Panel conditionally recommends a multicomponent allergen-specific mitigation intervention.	Conditional recommendation	Low certainty of evidence
In individuals with asthma who have sensitization or symptoms related to exposure to pests (cockroaches and rodents) the Expert Panel conditionally recommends the use of integrated pest management alone, or as part of a multicomponent allergen-specific mitigation intervention.	Conditional recommendation	Low certainty of evidence
In individuals with asthma who have sensitization or symptoms related to exposure to dust mites, the Expert Panel conditionally recommends impermeable pillow/mattress covers only as part of a multicomponent allergen mitigation intervention, not as a single-component intervention.	Conditional recommendation	Moderate certainty of evidence