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Priority Updates from the Research Literature from the Family Physicians Inquiries Network

Dust mite control measures don't help asthma patients

Forget about mattress covers and air filtration systems. They don't work, despite what the guidelines say

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Practice changer

Stop recommending dust mite control measures to your asthma patients. Neither chemical nor physical reduction measures are effective in improving peak flow, symptoms of asthma, or medication usage.[1]

Strength of recommendation

B: Based on a meta-analysis of 54 fair quality randomized trials in patients with mite-sensitive asthma

Gotzsche PC, Johansen HK. House dust mite control measures for asthma. *Cochrane Database Syst Rev.* 2008;(2):CD001187.

ILLUSTRATIVE CASE

The parents of a 10-year-old patient whom you recently diagnosed with asthma want to do everything they can to reduce his asthma symptoms. They are considering buying hypoallergenic mattress covers and an expensive air filtration system to decrease the levels of dust mite allergens in their home and want to know if you think that will help their son. What do you tell them?

We want to do everything we can to help our patients control their asthma symptoms, but when it comes to household dust mite control measures, this extensive Cochrane review confirms that interventions like mattress covers and air filtration don't work, despite recent reviews and guidelines recommending them.

Dust mites (*Dermatophagoides pteronyssinus*) are one of the most common allergens that provoke asthma symptoms in children and adults.[2] Dust mites live in warm, humid places and feed on human skin scales. The areas with the highest levels of household infestation are carpets, mattresses, pillows, drapes, upholstered furniture, and clothing.

Guidelines still encourage mattress cover use

The National Asthma Education and Prevention Program (NAEPP) 2007 guidelines recommend using allergen-impermeable mattress and pillow covers and washing sheets and blankets in hot water. They also recommend "considering" reducing indoor humidity, removing bedroom carpets, and washing stuffed toys weekly. The NAEPP Expert Panel cites many studies to support these recommendations.[3]

The National Environmental Education and Training Foundation (NEETF)

PURLs® INSTANT POLL

To what extent do you encourage or discourage patients from using dust mite control measures?

- ❑ Encourage most patients to use them
- ❑ Encourage selected patients to use them
- ❑ Neither encourage nor discourage patients
- ❑ Discourage patients from using them

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2005 guidelines recommend additional measures to reduce dust mite exposure including vacuuming using a high-efficiency particulate air (HEPA) filter, removing draperies, and considering using a portable air cleaner with a HEPA filter.[4]

STUDY SUMMARY

54 trials, but no support for dust mite measures

This Cochrane systematic review included 54 randomized trials that assessed the effects of physical and/or chemical interventions to reduce exposure to house dust mite antigens in the homes of patients with mite-sensitive asthma. These studies included a total of 3002 pediatric and adult asthma patients (9 - 628 patients analyzed per trial) with mite sensitization confirmed by skin testing or IgE serum assays.

Thirty-six studies tested physical interventions, including mattress covers, vacuum cleaning, heating, ventilation, freezing, washing, air filtration, and ionizers. Ten used chemical interventions to kill dust mites; 8 used a combination of physical and chemical methods. Control groups received either placebo or no treatment.

Outcomes studied. The authors extracted data for the following outcomes: subjective well-being, asthma symptom scores, use of medication, days of sick leave from school or work, number of unscheduled visits to a physician or hospital, forced expiratory volume in 1 second (FEV_1), peak expiratory flow rate (PEFR), and provocative concentration that causes a 20% fall in FEV_1 (PC20). Length of the intervention and follow-up ranged from 2 weeks to 2 years.

Quality of studies. According to modern standards for randomized trials, the quality of many of the 54 studies was not optimal, especially in the descriptions of randomization and the reporting of outcomes. The method of randomization and concealment of allocation was rarely described. Eleven trial reports did not contain any usable data for the meta-analysis because of the way data were reported, and there was significant potential for reporting bias in favor of a treatment effect in the studies included. Mite reduction was successful in 17 trials, unsuccessful in 24 trials, and not reported in 13 trials.

Interventions didn't help. There were no differences between the intervention and control groups for any of the outcomes. The percentage of patients who improved after the experimental interventions was not significantly different from the percentage of patients in the control groups (relative risk [RR]=1.01; 95% confidence interval [CI], 0.80-1.27; data based on 7 trials). There was no difference in medication usage (data from 10 trials), FEV_1 (data from 14 trials), morning PEFR (data from 23 trials), or PC 20 (data from 14 trials) between the intervention and control groups (**TABLE**).[1]

FAST TRACK

There was no difference in medication usage, FEV_1, or morning peak flow between patients who used mattress covers and air filtration systems and those who did not

PURLs methodology

This study was selected and evaluated using FPIN's Priority Updates from the Research Literature (PURL) Surveillance System methodology. The criteria and findings leading to the selection of this study as a PURL can be accessed at www.jfponline.com/purls.

WHAT'S NEW?

Nothing is new, yet this will be "news" to many

This Cochrane review includes 5 additional trials that have been conducted since the last Cochrane review of this topic in 2004. However, the 2004 review reported the same conclusion—that interventions to reduce house dust mite exposure in asthma patients are ineffective—as did 3 other Cochrane reviews on the same topic beginning in 1998.[5-8]

So why are the guidelines out of step? Schmidt and Gøtzsche (one of the authors of the Cochrane review) conducted a systematic review of narrative review articles in 2005 to answer this question. They found 70 review articles, 90% of which recommended physical methods to reduce exposure to house dust mites. They discovered that although these review articles included references to support their recommendations of dust mite control measures, the reviews showed significant bias in favor of positive studies

and highlighted the results of low-quality studies, including non-randomized studies that had been excluded from the Cochrane reviews.[9]

CAVEATS

Duration of studies not long enough?

We know that extreme measures to reduce exposure to dust mite allergen, such as relocating to a high altitude or prolonged hospitalization, can reduce asthma symptoms,[10,11] but these are clearly not practical solutions for most patients with dust mite-sensitive asthma. When it comes to this Cochrane review, some might argue that many of the interventions included were not of sufficient duration and did not sufficiently reduce the level of house mite allergen to improve asthma symptoms.

However, the subgroups of trials with long treatment duration (1-2 years) and successful mite reduction (determined by different methods, including mite counts and measured antigen levels in dust samples) also failed to show a significant difference between intervention and control groups.[1]

Tweak the approach? Most dust mite-sensitive asthma patients are sensitive to other allergens, so perhaps multifaceted interventions that target multiple allergens would be more effective.[12] But until these potential interventions are supported by stronger evidence, we should not recommend them to our patients.

CHALLENGES TO IMPLEMENTATION

Swimming against the tide is never easy

Although the evidence to date indicates that interventions to reduce home dust mite exposure are ineffective, there are hundreds of products—including mattress and pillow covers ($10-$100), ionizers ($100-$200), and air filtration systems ($500-$800)—that are being marketed to patients with asthma. In addition, patient education handouts from sources such as the American Academy of Family Physicians, the American Academy of Pediatrics, and UpToDate recommend implementing dust mite control measures to reduce dust mite allergen exposure.[13-15]

We need to start educating our asthma patients properly so they can spend their time, energy, and money on interventions, such as medications, that work—and not on interventions that make no difference. ■

TABLE

Dust mite control measures didn't improve these outcomes

OUTCOME	STANDARDIZED MEAN DIFFERENCE* (95% CI)
Medication usage	-0.06 (-0.18 to 0.07)
FEV_1	0.11 (-0.05 to 0.28)
Morning PEFR	0.00 (-1.0 to 0.10)
PC 20	0.05 (-0.13 to 0.22)

CI, confidence interval; FEV_1, forced expiratory volume in 1 second; PC20, provocative concentration that causes a 20% fall in FEV_1; PEFR, peak expiratory flow rate.

*Standardized mean difference is a common way to combine results of different studies for comparison purposes. If the 95% CI crosses 0, there is no effect of the intervention compared with the control.

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References

1. Gotzsche PC, Johansen HK. House dust mite control measures for asthma. *Cochrane Database Syst Rev.* 2008;(2):CD001187.
2. German JA, Harper MB. Environmental control of allergic diseases. *Am Fam Physician.* 2002;66:421-426.
3. National Asthma Education and Prevention Program (NAEPP). Control of environmental factors and comorbid conditions that affect asthma. In: Expert panel report 3: guidelines for the diagnosis and management of asthma. Bethesda, Md: National Heart, Lung, and Blood Institute; 2007.

CONTINUED

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FAST TRACK

Despite a lack of evidence, patient handouts from the American Academy of Family Physicians and the American Academy of Pediatrics still recommend dust mite control measures

4. National Environmental Education & Training Foundation (NEETF). Environmental management of pediatric asthma. Guidelines for health care providers. Washington, DC: National Environmental Education & Training Foundation (NEETF); 2005.
5. Gøtzsche PC, Hammarquist C, Burr M. House dust mite control measures in the management of asthma: meta-analysis. *BMJ.* 1998;317:1105-1110.
6. Hammarquist C, Burr ML, Gotzsche PC. House dust mite control measures for asthma. *Cochrane Database Syst Rev.* 2000;(2):CD001187.
7. Gøtzsche PC, Johansen HK, Burr ML, Hammarquist C. House dust mite control measures for asthma. *Cochrane Database Syst Rev.* 2001;(3):CD001187.
8. Gøtzsche PC, Johansen HK, Schmidt LM, Burr ML. House dust mite control measures for asthma. *Cochrane Database Syst Rev.* 2004;(4):CD001187.
9. Schmidt LM, Gøtzsche PC. Of mites and men: reference bias in narrative review articles: a systematic review. *J Fam Pract.* 2005;54:334-338.
10. Platts-Mills TA, Tovey ER, Mitchell EB, Moszoro H, Nock P, Wilkins SR. Reduction of bronchial hyperreactivity during prolonged allergen avoidance. *Lancet* 1982;2:675-678.
11. Grootendorst DC, Dahlen SE. Benefits of high altitude allergen avoidance in atopic adolescents with moderate to severe asthma, over and above treatment with high dose inhaled steroids. *Clin Exp Allergy.* 2001;31:400-408.
12. Morgan WJ, Crain EF, Gruchalla RS, et al. Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med.* 2004;351:1068-1080.
13. American Academy of Family Physicians. Dust mites in the home [patient handout]. Available at: http://familydoctor.org/online/famdocen/home/common/asthma/triggers/683.html. Accessed October 23, 2008.
14. American Academy of Pediatrics. Non-pharmacologic approaches to asthma management [patient handout]. Available at: http://www.aap.org/sections/allergy/nonrxchild.pdf. Accessed October 23, 2008.
15. Bailey W. Patient information: Trigger avoidance in asthma. UpToDate [online database]. Version 16.2. Waltham, Mass: UpToDate; 2008.

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