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REG	Copy	Journal
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TITLE:	ALLERGY AND ASTHMA PROCEEDINGS : THE OFFICIAL JOURN
PUBLISHER/PLACE:	OceanSide Publications Providence, R.I. :
VOLUME/ISSUE/PAGES:	2008 Jan-Feb;29(1):40-4 40-4
AUTHOR OF ARTICLE:	White K;Nugent J;Rathkopf M
TITLE OF ARTICLE:	DUST-MITE AVOIDANCE MEASURES IN PATIENTS ON IMMUNO
ISSN:	1088-5412
OTHER NUMBERS/LETTERS:	Unique ID.: 9603640 18302837
SOURCE:	PubMed
MAX COST:	\$12.00
COPYRIGHT COMP.:	Guidelines
REQUESTER INFO:	Demain, Jeffre ARH [265]
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Dust-mite avoidance measures in patients on immunotherapy

Kevin M. White, M.D., Jeffrey S. Nugent, M.D., and Melinda M. Rathkopf, M.D.

ABSTRACT

The compliance of dust-mite (DM) allergic patients receiving immunotherapy (IT) with environmental avoidance measures has not been reported. To investigate patient practices, a questionnaire was distributed to patients receiving IT for indoor allergens. Ninety-three of 200 patients (46%) with indoor allergies completed the questionnaire. Of the 93 patients, 69% were allergic to DMs, 45% were allergic to pets, 17% were allergic to mold, and 3% were allergic to cockroaches. Of 64 patients allergic to DMs, 53% reported use of mattress covers, 61% reported use of pillow covers, 81% reduced moisture in their homes, 83% washed their bed linens in water that was >130°F, 77% vacuumed or dusted weekly, and 21% replaced carpets with polished flooring. Fifty-two percent of patients who did not use covers and 49% who did not replace their carpets cited cost as the most common reason. Education about the use of DM covers was reported by 97% of patients allergic to DMs, predominantly by physicians. In conclusion, many patients on IT for DM allergy do not use avoidance measures for decreasing allergen exposure. Cost appears to influence compliance with several measures including protective mattress and pillow covers. It may be unreasonable to require most patients to use such avoidance measures before being candidates for IT.

(Allergy Asthma Proc 29:40-44, 2008; doi: 10.2500/aap2008.29.3079)

Key words: Allergen avoidance, bedding, compliance, dust mite, education, encasements, environment, home, immunotherapy, questionnaire

Allergy to indoor allergens is common in patients with allergic rhinitis and asthma. Major indoor allergens include dust mite (DM), animal dander, mold, and cockroach. Avoidance of indoor allergens is commonly recommended for those who are sensitized.¹⁻⁴ Indications for allergen immunotherapy (IT) include poor response to pharmacotherapy or allergen avoidance.⁵

The compliance of allergic patients with allergen avoidance measures is not ideal. For example, a recent study compared the knowledge and practice of allergen avoidance in the families of DM-allergic asthmatic children who had been evaluated by either a pediatrician or an allergist.⁶ This study noted that patients who had seen an allergist had better knowledge and compliance with allergen-proof mattress and pillow covers

than those who had seen a pediatrician. However, <50% of patients who had seen an allergist had actually placed encasements on their children's beds.

Controversy exists regarding the efficacy of measures to reduce indoor allergen exposure. In a randomized study of DM-sensitized patients with allergic rhinitis, impermeable pillow and bedding encasements did not provide significant clinical benefit.⁷ This may indicate that more comprehensive measures are required to substantially decrease allergen exposure in the home.⁸ In addition, a randomized placebo-controlled study in DM-sensitized asthmatic patients with similar encasements also found no improvement of symptoms, despite a reduction in the allergen content of bedding.⁹

OBJECTIVE

The purpose of this study was to assess compliance with DM avoidance measures in patients on immunotherapy (IT), a population in which compliance has not been reported previously. In addition, this study attempted to identify the source of education on avoidance measures, assess patient satisfaction with compliance measures, and investigate the reasons for noncompliance.

STUDY DESIGN AND METHODS

Approval for the study was obtained through the institutional review board at Wilford Hall Medical Center (Lackland Air Force Base, TX). A question-

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Data from this study were presented at the 2003 Air Force regional meeting of the American College of Physicians-American Society of Internal Medicine (ACP-ASIM) and at the 2003 Annual Meeting of the American College of Asthma, Allergy and Immunology (ACAAI) but has not been otherwise disseminated or published

No grant support was obtained for this study

Institutional or corporate affiliations of each author: K.M. White, none; J.S. Nugent, none; M.M. Rathkopf, Allergy, Asthma Immunology Center of Alaska, LLC

The opinions and assertions contained herein are the private views of the authors and are not to be construed as reflecting the views of the Department of the Air Force, the Department of Defense, or the U.S. Government

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Table 1 Distribution of allergy to indoor allergens in patients on IT

Allergen	All IT Patients (n = 200)	Responders (n = 93)
DM	129 (64%)	64 (69%)
Pets	90 (45%)	42 (45%)
Mold	40 (20%)	17 (18%)
Cockroach	9 (1.5%)	3 (3%)

naire was devised that asked patients on IT whether they performed avoidance measures to indoor allergens. Specific evidence-based avoidance measures were drawn from recent reviews^{1,10} and the questionnaire included those with high and low levels of efficacy. The specific measures asked on the questionnaire included the following: encasing mattresses/pillows or quilts with impermeable covers, washing bed linens in water at least 130°F, vacuuming/dusting weekly, using vacuum high efficiency particulate air filters, replacing carpets with tile/wood/linoleum floors, using a dehumidifier or air conditioning (reducing moisture), replacing drapes with washable shades/blinds, minimizing upholstered furniture, and removing or freezing soft toys.

The questionnaire also asked for the source of education on each measure (physician, handout, friends, news, other, or was not educated), and the reason measures were not done (other measures were enough, did not know, cost, time, does not work, or other). Answers on the questionnaire were multiple choice, and numbers were associated with each answer for ease in tabulation. The questionnaire was distributed to patients receiving IT after receiving their informed consent. Questionnaires were passed out over a 4-month period in the IT clinic at our institution.

RESULTS

There were ~350 patients at Wilford Hall Medical Center who were receiving IT at the time of this study. Of those patients, 200 were receiving IT to indoor allergens. Ninety-three (46%) patients allergic to indoor allergies completed the study questionnaire. The patients were, on average, 40 years old (range, 5–68 years; median, 43 years) and had been on IT for an average of 5 years (range, 1 week to 40 years; median, 2.5 years). The distribution of allergy to indoor allergens is shown in Table 1 and is similar in those who completed surveys when compared to all patients on IT.

Sixty-four of 93 survey responders (69%) were allergic to DMs. The compliance rates for DM avoidance measures are summarized in Table 2. Thirty-four (53%) and 39 (61%) of DM-allergic patients reported use of a

Table 2 Compliance rates for DM avoidance measures

Measure	Compliance (n = 64)
Mattress cover	53%
Pillow cover	61%
Mattress or pillow cover	67%
Quilt cover	8%
Replaced carpet	20%
Vacuum HEPA	69%
Wash linens in >130°F	83%
Upholstered furniture	27%
Vacuum/dust weekly	77%
Reduced moisture	81%
Replaced drapery	48%
Remove/freeze toys	23%

HEPA = high efficiency particulate air.

mattress and pillow covers, respectively. Forty-three patients (67%) used either a mattress or pillow cover. All patients who used a mattress or a pillow cover reported receiving education about their use and 20 of 21 patients (95%) who did not use either cover reported receiving education about their use (2 patients did not answer the question in each group). Of the 43 patients who used either cover, 40 (93%) reported receiving education about their use by their physician, 16 (37%) reported education from a handout, and 7 (16%) reported another source of education such as a friend, news, or "other." The education sources for all DM measures, regardless of compliance, are listed in Table 3. When patients who used covers were asked if they were effective, 35 of 43 (81%) patients stated "yes" or "pretty good" on the survey as opposed to 5 (12%) patients who stated "a little" or "not at all," with 3 patients not responding. The predominant reason cited for not using covers was cost (see Table 4), by 11 of 24 patients (52%), followed by "other measures enough" by 6 patients (29%).

DISCUSSION

This study evaluated the compliance of patients on IT for DM with environmental avoidance measures by using a questionnaire. Several conclusions can be drawn.

Compliance Rates in This Study Are Similar to Previously Published Rates of Compliance in Patients not on IT

In DM-allergic children who have asthma, compliance with mattress and pillow encasements has been reported recently ranging from 36 to 50% after physician education.^{5,7} Compliance in these studies was

Table 3 Source of reported education for DM measures regardless of compliance

Measure	M.D. (%)	Handout (%)	Friend (%)	News (%)	Other (%)
Mattress cover	91	30	3	6	5
Pillow cover	87	28	5	8	5
Mattress or pillow cover	93	37	5	7	5
Quilt Cover	56	20	3	3	2
Replaced carpet	58	23	3	3	6
Vacuum HEPA	61	27	3	8	14
Wash linens in hot water	77	31	3	6	8
Upholstered furniture	52	27	2	5	5
Vacuum/dust weekly	75	28	3	6	12
Reduced moisture	66	22	5	5	11
Replaced drapery	52	23	5	6	5
Remove/freeze toys	34	16	6	3	5

Patients could select more than one response.

HEPA = high efficiency particulate air.

Table 4 Reason cited for noncompliance with DM measures

Measure	Cost (%)	Other Measures Enough (%)	Time (%)	Did Not Know (%)	Did Not Work (%)	Other (%)
Mattress cover	37	37	13	7	10	13
Pillow cover	40	24	12	4	4	16
Mattress or pillow cover	52	29	14	9	5	14
Quilt cover	19	8	5	7	5	8
Replaced carpet	49	16	4	4	4	8
Vacuum HEPA	40	20	5	15	0	0
Wash linens in hot water	9	27	27	9	9	27
Upholstered furniture	45	17	2	11	2	11
Vacuum/dust weekly	0	20	40	0	7	20
Reduced moisture	33	8	0	0	0	0
Replaced drapery	21	18	6	12	3	6
Remove/freeze toys	2	14	6	16	0	8

Patients could select more than one response.

HEPA = high efficiency particulate air.

confirmed with home visits. In one study, compliance with carpet removal was 26%.⁶ In our study, 56% of patients receiving IT to DM reported use of pillow covers and 49% reported use of mattress covers. Twenty percent of patients reported replacement of carpets with polished flooring. It is possible that our data overestimated compliance because there were no independent confirmations with home visits. This indicates that patients on IT to DM may have a similar compliance rate to reported rates in patients not on IT. One might have expected higher compliance in patients symptomatic enough to be on IT. One also could theorize that patients on IT might be less compliant because they may feel they do not need to practice avoidance while on IT. Based on the

responses, 29% of patients who did not use DM covers cited that "other measures were enough," indicating that there was a population of patients who may be in the latter group.

Cost Is a Significant Barrier for Use of Avoidance Measures

As can be seen in Table 2, patient compliance appears to be highest with those measures that do not involve a significant cost or change in lifestyle (e.g., vacuuming, washing linens, and reducing moisture). Regarding the purchase of protective DM encasements or making significant changes to the home (e.g., removing carpets), it appears cost has a significant influence

on the decision. Essentially, all patients were educated about the use of DM covers, which are part of a first-line environmental approach to avoidance; however, they cited cost most often as the reason they did not use the protective covers. The cost of encasing a queen-sized mattress, pillows, and box spring can range from \$60 to >\$150, depending on the type of material purchased (based on query of materials previously found to be effective¹¹). Previously, it has been reported that economic factors play a role in the compliance of patients with allergen avoidance measures. In a population of DM-allergic patients who have asthma, a higher proportion of patients from a high socioeconomic status reported compliance with plastic mattress covers when compared with patients in a lower socioeconomic status.¹² Providing DM covers to families with children who had asthma and positive skin tests for DM increased their compliance with using covers, when assessed 2–3 months later.¹³ Interestingly, in the latter study, cost was the most common reason for noncompliance with DM covers, regardless of annual household income.

The Majority of Education That Patients Report Receiving Comes from Their Physicians

A recent investigation⁶ noted that a patient's knowledge of environmental control measures is not necessarily reflected in their implementation of allergen avoidance in the home, because more patients reported knowledge of measures than those who complied. This also was true in our study, because patients reported high levels of education about DM avoidance measures. Typically, patients were educated by a physician who also often used a handout. It was not specifically asked in our questionnaire, but it is likely the educating physicians were the patients' allergists, because allergists were actively following all patients.

Limitations of the Study

This study has several limitations. First and foremost, this was a questionnaire-based study and is subject to limitations. We were limited by patient understanding of questions, because they completed the questionnaire without assistance by a health care professional. There was no independent confirmation of compliance. There was no follow-up interview to clarify responses by patients, such as if they left a particular question blank or checked "other" but did not fill in their answer to a question. Another limitation was that compliance with completing the questionnaire was ~50% of the targeted individuals. This is mitigated by the distribution of allergies, seen in Table 1, which was similar in those patients who completed surveys when compared with those who did not. How-

ever, it is possible that the responses of the rest of the patients may have affected the conclusions of this study.

Potential Solutions

Our study suggests that most patients on IT are educated about DM avoidance measures. It suggests that patients who comply with measures feel that they work well. It also indicates that patients on DM IT are not performing essential aspects of avoidance. What solutions can we offer to improve compliance? Certainly, lowering the cost of protective bedding covers may increase compliance. This could be accomplished by insurance reimbursement for cover purchases in patients with a documented clinical allergy to DM. In addition, reinforcement of DM avoidance at each clinic visit could improve compliance. To decrease the workload of the busy clinician, a questionnaire (such as was used in this study) could be given to patients before their appointment so that the responses could trigger appropriate discussion. Also, a recent study looked at ancillary medical personnel functioning as educators and the role they play in improvement of compliance. This was shown to improve compliance and to decrease the amount of DM allergen in mattress bases and carpets when measured 5 months later.¹⁴ A trained individual, much like an asthma educator, could help reinforce the education provided by clinicians on avoidance measures. This could be done by the nurse or technician during the administering of IT. Looking at this data from another perspective, one might conclude that requiring a patient to comply with avoidance measures as criteria for starting or maintaining IT is unrealistic. This is particularly important because true avoidance of DM exposure is difficult to attain and may involve more comprehensive changes to the home other than bedding encasements.⁸

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