

Current practice trends in allergy: results of a united states survey of otolaryngologists, allergist-immunologists, and primary care physicians

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Background: Clinical practices for the diagnosis and treatment of allergic disease evolve over time in response to a variety of forces. The techniques used by various physician specialties are not clearly defined and may vary from published descriptions or recommendations in the literature.

Methods: This work is a Web-based survey enrolling 250 U.S. physicians in the following specialties: otolaryngology (ENT), allergy-immunology (A/I), and primary care (PCP).

Results: Respondents reported that skin-prick testing is the most common diagnostic testing method, followed by in vitro specific immunoglobulin E (IgE) testing. ENTs were more likely to use intradermal testing compared to other specialties ($p = 0.0003$ vs A/I; $p < 0.0001$ vs PCP). Respondents reported a wide distribution in number of allergens tested, regardless of testing method (range, 11 to >60). Significant use of home immunotherapy injections (defined as >10% of immunotherapy patients) ranged from 27% to 36% of physicians, with no statistically significant difference noted based upon specialty. PCPs reported greater

use of sublingual immunotherapy (PCP, 68%; A/I, 45%; otolaryngology, 35%; A/I vs PCP, $p = 0.005$; ENT vs PCP $p < 0.001$)).

Conclusion: A variety of allergy testing and treatment methods are employed by U.S. physicians, with some differences noted based upon specialty. Home immunotherapy continues to be employed in allergy practices, and sublingual immunotherapy is a common form of delivery, especially in primary care practices. © 2014 ARS-AAOA, LLC.

Key Words:

allergy; allergen immunotherapy; sublingual immunotherapy; home immunotherapy; allergy testing; food allergy

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A variety of forces shape “real-life” practice patterns in allergy diagnosis and treatment. Payor policies determine which diagnostic and treatment approaches are reimbursed. Position papers and practice guidelines, which often draw upon high level published evidence, guide the profession to adopt or discard certain approaches over time. However, it is difficult to gauge the effects of these forces

on individual practice patterns. The goal of this study is to describe current practice patterns of allergy care in the United States among primary care physicians (PCPs), allergist-immunologists (A/Is), and otolaryngologists (ENTs).

Many approaches are available for the diagnosis and treatment of inhalant allergy. Skin testing has historically been the primary approach to determine type I hypersensitivity to inhalant allergens, and a variety of skin testing methods are available. The various skin test methods all have certain perceived advantages, yet none is clearly superior. Since the characterization of immunoglobulin E (IgE) in 1967, a variety of in vitro testing systems to detect and quantitate serum specific IgE have been developed, and as these systems have improved, in vitro testing has become more common. It is unknown which of these methods is mostly commonly employed in practice in the United States.

Some payors have limited the number of specific allergens that can be tested, yet there is little published data of the number of allergens tested by most physicians. The number of allergens selected for testing depends upon a variety of

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geographic and patient factors. Previous guidelines have recommended <70 prick tests or <40 intracutaneous tests be used in ordinary practice.¹ The practice trends survey provides insight into the number of specific allergens that are commonly tested in day-to-day practice.

Allergen-specific immunotherapy (AIT) is the only treatment that holds the potential to alter the natural history of allergic disease, and a variety of immunotherapy treatment approaches are now used. Both subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT) are effective treatments for allergic disease.²⁻⁴ The practice of patient self-administration of SCIT injections at home is controversial. Consensus statements warn about the dangers of home immunotherapy,⁵ although other reports suggest that the practice is safe with appropriately selected patients.⁶⁻⁸ The controversy surrounding “home immunotherapy” may be partially attributed to the modern trend toward using more concentrated allergen extracts, coupled with increasing awareness of the risk of anaphylaxis with these higher doses of vaccine. The rates of continued home immunotherapy use are unknown.

SLIT is increasingly used in the United States despite the lack of U.S. Food and Drug Administration (FDA) approval of extracts specifically for this purpose. Currently, glycerinated extracts approved for SCIT are used to make SLIT treatment vials, and most payors do not cover SLIT. There are minimal studies that describe how commonly SLIT is used by U.S. physicians; a 2008 survey by the American Association of Allergy, Asthma, and Immunology (AAAAI) reported SLIT use at 5.9%.⁹

Materials and methods

In 2011, the American Academy of Otolaryngic Allergy (AAOA) commissioned Alembic Health Communications (New York, NY) to design a practice trends survey of physicians in the United States who perform allergy testing and immunotherapy. The survey questions were drafted by a task force of AAOA members with the assistance of Alembic personnel. The survey was administered online by Sermo (Cambridge, MA) and the source of the survey was not disclosed to the respondents. The pool of potential respondents was drawn from the Sermo database of U.S. physicians who identified themselves as PCPs, A/Is, and ENTs. Overall, 1559 PCPs and A/Is were invited to take the survey; 292 started the survey and 146 completed it (88 PCPs, 58 A/Is). Of 1479 ENTs invited to take the survey, 211 started the survey and 104 completed it.

A biostatistician was employed to statistically analyze the data set. Analysis of variance (ANOVA) or Kruskal-Wallis tests were used to compare continuous values among 3 groups of A/I, ENT, and PCP physicians. When the ANOVA or Kruskal-Wallis test showed significant results ($p < 0.05$), Student *t* tests or Wilcoxon pairwise comparisons were conducted to identify which pairs of groups were significantly different using Bonferroni corrections ($p < 0.017 = 0.05/3$). Fisher's exact or chi-square tests

were used to compare categorical values among the 3 groups. When the Fisher's exact or chi-square test showed significant results ($p < 0.05$), pairwise comparisons were conducted to identify which pairs of groups were significantly different using Bonferroni corrections.

Results

From the initial pool of invited respondents, 88 PCPs, 58 A/Is, and 104 ENTs completed the survey. All of these respondents reported that they perform allergy skin testing and administer immunotherapy in their practices. Of A/I respondents, 98% reported membership in the AAAAI, and 79% reported membership in the American College of Allergy, Asthma, and Immunology (ACAAI). Of ENT physician respondents, 100% reported membership in the AAOA. Of PCP respondents, 76% reported membership in the American Academy of Family Physicians, 39% in the AAAAI, and 34% in the ACAAI.

Indications for allergy testing

Overall, respondents indicated that the most common reason to perform allergy diagnostic testing was to establish the diagnosis and direct allergen avoidance measures (Table 1). However, ENTs indicated that allergy testing was most commonly performed after patients had failed treatment with appropriate pharmacotherapy.

Preferred allergy test method

Respondents were asked to rank their preferred method for allergy testing in rhinitis patients from most to least common. Results for most common and least common test method by specialty are shown in Table 2. Overall, the most common diagnostic test was skin-prick testing followed by single dilution intradermal testing. However, some specialty differences were noted. Prick testing was reported as more common by A/Is and PCPs ($p = 0.0005$ A/I vs ENT; $p = 0.03$ ENT vs PCP). Among ENTs, intradermal dilutional testing appears to be the most common testing modality ($p = 0.0003$ A/I vs ENT; $p < 0.0001$ ENT vs PCP). There was no statistically significant difference in usage of single-dilution intradermal tests or in vitro specific IgE testing among specialties.

Testing rhinitis patients for food allergy

In response to the question “Do you routinely test your rhinitis patients for food allergy?” 19% of A/I, 13% of PCP, and 9% of ENT respondents reported that they test for food allergy most of the time (Table 3). The difference among specialties was not statistically significant. The most common methods of testing for food allergy were skin-prick testing (31%) and in vitro specific IgE testing (30%). Testing methods for food allergies were significantly different among specialties. In vitro specific IgE testing was the most common form of food allergy testing reported by Otolaryngologists (44%), followed by prick testing (21%).

TABLE 1. Most common reason allergy testing is typically performed*

Reason	Otolaryngologists (n = 104) (%)	Allergists/immunologists (n = 58) (%)	Primary care providers (n = 88) (%)	All respondents (n = 250) (%)
For patients with symptoms of allergies to establish the diagnosis and direct avoidance measures	28.8	84.5	51.1	49.6
For patients that have failed treatment with appropriate pharmacotherapy	48.1	10.3	30.7	33.2
When considering immunotherapy as an additional treatment option	23.1	5.2	18.2	17.2
Other	0	0	0	0

*All values are the percentage of respondents.

TABLE 2. Need table title

Specialty	Most common allergy test method for rhinitis	Least common allergy test method for rhinitis
Otolaryngology	Intradermal dilution test (37%)	In vitro (sIgE) (29%)
Allergy/immunology	Prick test (64%)	Intradermal dilution test (51%)
Primary care	Prick test (43%)	In vitro (sIgE) (33%)

sIgE = specific immunoglobulin E.

ENTs are more likely to use in vitro specific IgE than A/Is ($p < 0.0001$) or PCPs ($p = 0.0117$). Allergists and PCPs use prick testing more commonly, but there was no statistically significant difference among specialties for prick testing. Intradermal tests and intradermal dilutional testing were ranked as less common testing methods with no statistical significance among specialties. While in vitro specific IgG testing was ranked as a less common testing method, 16% of ENTs ranked IgG testing as a more common method compared to PCPs (4%) ($p = 0.0139$).

Number of antigens tested

Respondents were given forced choice ranges to specify the number of allergens they typically test for with prick testing, intradermal testing, and in vitro specific IgE test-

ing. Respondents reported a wide range in number of allergens tested (Fig. 1). Overall for prick, intradermal, and in vitro specific IgE testing the most commonly reported range (mode) was 11 to 20 allergens. Some differences were noted based upon physician specialty. The median number of prick tests for A/I respondents was 31 to 40 allergens, compared to 21 to 30 allergens for PCPs and ENTs ($p = 0.0001$ A/I vs ENT; $p = 0.0009$ A/I vs PCP). However, A/Is reported fewer allergens tested with in vitro specific IgE testing (median, 11–20) compared to ENTs or PCPs (both median 21–30; $p = 0.0021$ A/I vs ENT; $p = 0.0037$ A/I vs PCP). ENTs use more allergens for single intradermal testing (median, 21–30) than A/I or PCPs (both median 11–20; $p = 0.0001$ A/I vs ENT; $p = 0.0219$ ENT vs PCP), and both PCPs and ENTs use more allergens for intradermal dilution testing than A/I (ENT and PCP median 21–30 vs A/I median 11–20; $p = 0.0251$ for A/I vs ENT; $p = 0.0065$ A/I vs PCP). Overall, these data show comparable numbers of allergens tested by all specialties.

SLIT

Respondents were asked if they use SLIT in their practices, and if so, what percentage of their overall AIT patients were treated with sublingual administration. 68% of PCPs, 45% of A/Is, and 36% of ENTs reported that >10% of their immunotherapy patients are treated with sublingual delivery ($p = 0.005$ A/I vs PCP; $p < 0.0001$ ENT vs PCP). A wide range of SLIT use was reported, with some ENT and A/I practices reporting up to 80% of all their AIT patients

TABLE 3. Frequency of testing rhinitis patients for food allergy*

Response	Otolaryngologists (n = 104) (%)	Allergists/immunologists (n = 58) (%)	Primary care providers (n = 88) (%)	All respondents (n = 250) (%)
Never	3.8	19.0	4.5	7.6
Seldom	35.6	27.6	18.2	27.6
Some of the time	51.9	34.5	64.8	52.4
Most of the time	8.7	19.0	12.5	12.4

*All values are the percentage of respondents.

A

Response	Chart	Frequency
1 to 10		9.20%
11 to 20		27.60%
21 to 30		27.20%
31 to 40		18.00%
41 to 50		10.10%
51 to 60		4.40%
>60		3.50%

B

Response	Chart	Frequency
1 to 10		20.60%
11 to 20		33.90%
21 to 30		25.30%
31 to 40		11.60%
41 to 50		3.90%
51 to 60		1.70%
>60		3.00%

C

Response	Chart	Frequency
1 to 10		19.70%
11 to 20		32.60%
21 to 30		24.80%
31 to 40		13.30%
41 to 50		5.50%
51 to 60		1.40%
>60		2.80%

D

Response	Chart	Frequency
1 to 10		14.80%
11 to 20		36.10%
21 to 30		26.60%
31 to 40		11.50%
41 to 50		6.10%
51 to 60		1.60%
>60		3.30%

FIGURE 1. Number of antigens tested based upon test method. (A) What is the average total number of inhalant antigens you typically test for when performing prick testing? (B) What is the average number of single intradermal skin tests you perform on a patient? (C) What is the average number of individual antigens you test for during intradermal dilutional testing? (D) What is the average number of antigens you test for with antigen specific IgE (in vitro) allergy testing? IgE = immunoglobulin E.

on SLIT, and 1 PCP reporting 100% of AIT patients on SLIT.

SLIT vial mixing

Overall, 46% of SLIT vials are mixed in the physician office. Almost 60 percent (59%) of ENTs mix their own SLIT vials compared to 57% for A/Is and 32% for PCPs. PCPs were significantly more likely to use a commercial entity for SLIT vial mixing ($p = 0.0018$ vs ENT; $p = 0.0173$ vs A/I) (Table 4)

SCIT vial mixing

Seventy-eight percent (78%) of ENTs and A/Is reported that they mix SCIT vials in their office compared to 37% of PCPs. Overall, 64% of subcutaneous immunotherapy vials are prepared in the physician office and PCPs were significantly more likely to outsource the mixing of subcutaneous immunotherapy vials, compared to the other specialties ($p < 0.0001$ vs ENT and A/I) (Table 4).

Home immunotherapy

Respondents were asked if they allowed their patients to self-administer AIT injections at home, and if so, what percentage of their AIT patients were treated with home

injections. Most respondents reported that they do not allow their patients to receive home AIT injections. However, wide variations in practice patterns were noted: 36% of PCPs, 33% of A/Is, and 27% of ENTs reported that >10% of their immunotherapy patients receive home immunotherapy injections ($p = 0.37$ among specialties). In A/I practices, up to 40% of patients were treated with home AIT, in PCP practices up to 60% and in ENT practices, up to 80%, demonstrating a wide range of home AIT injection use.

Observation after office injections

All respondents reported that they observe patients in their office after an AIT injection. The median observation time for ENT was 11 to 20 minutes (reported by 59% of respondents). The median wait time for A/Is and PCPs was 21 to 30 minutes (both $p < 0.0001$ vs ENT); 41% of PCP patients are observed for 20 minutes or less, and 38% of A/I patients are observed for 20 minutes or less (Table 5).

Epinephrine autoinjectors for patients

Eighty-six percent (86%) of ENT respondents and 76% of PCP respondents reported that they recommend patients have an epinephrine autoinjector available to them in the

TABLE 4. Location at which immunotherapy vials are produced*

Location	Otolaryngologists (n = 104)		Allergists/immunologists (n = 58)		Primary care providers (n = 88)		All respondents (n = 250)	
	SCIT	SLIT	SCIT	SLIT	SCIT	SLIT	SCIT	SLIT
In my office	78.4% (80/102)	58.9% (33/56)	77.6% (45/58)	56.7% (17/30)	36.8% (32/87)	31.5% (23/73)	63.6% (157/247)	45.9% (73/159)
Outsourced to a commercial company	21.6% (22/102)	41.0% (23/56)	22.4% (13/58)	43.3% (13/30)	63.2% (55/87)	68.5% (50/73)	36.4% (90/247)	54.1% (86/159)

*All values are percentage of respondents (number of respondents meeting the location category over the number of respondents per physician type and SCIT or SLIT). SCIT = subcutaneous immunotherapy, SLIT = sublingual immunotherapy.

hours after they undergo an immunotherapy injection, compared to 43% of A/Is ($p < 0.0001$ vs ENT; $p < 0.0001$ vs PCP)

Discussion

Allergy testing methods and number of allergens tested

An accurate diagnosis of allergic disease depends primarily upon the history of the patient. Allergy diagnostic testing serves to confirm the diagnosis, identify the relevant allergens to direct avoidance measures, and finally to identify relevant allergens for immunotherapy. Skin tests have the longest track record of use. Prick testing is felt by many to be the superior method of allergy testing because it may be more sensitive than in vitro testing, and more specific than intradermal or intradermal dilutional testing.⁹ However, in vitro testing is cited as being more specific in that actual IgE levels are measured with the assay and aberrant skin responses do not confound the results.¹⁰ The choice of test method used in practice depends upon a variety of factors. A physician's background and training may influence the preferred approach, and in this survey we did find significant differences in testing approach based upon specialty. For example, ENTs were significantly more likely to use intradermal dilutional testing than other specialties.

Published practice parameters recommend that the number of allergens used for testing be determined by multiple factors, including the patient's history, age, geographic location, occupation, living environment, and activities.⁹ Ideally, allergy tests should be performed only for those allergens that are likely to be causing a patient's symptoms. However, in practice, especially with patients who have perennial or persistent symptoms and an unclear history of obvious triggers, a panel of allergens is used to sample for sensitivity to aeroallergens in the patient's environment. The appropriate selection of a testing panel should take into account the local environment as well as patterns of cross-reactivity among allergens. The literature is replete with cautions against excessive testing in terms of number of allergens and frequency of testing. Previous guidelines have recommended <70 prick tests or <40 intracutaneous tests be used in ordinary practice.⁹ Our study showed a wide range in number of allergens tested, but regardless of test method, the most commonly reported panel size was 11 to 20 allergens. Depending upon physician specialty and method of testing, small differences were noted. But overall it did not appear that physician specialty had an impact on the number of allergens tested.

Testing rhinitis patients for food allergy

Food allergy is an uncommon cause of isolated rhinitis or asthma symptoms, and foods are rarely a cause of allergic rhinitis.^{10,11} Allergic rhinitis is not a risk factor for food allergy.¹¹ Published guidelines recommend that testing for food allergy should only be performed if a particular food

TABLE 5. Length of in-office observation of patients after immunotherapy injection*

Wait time	Otolaryngologists (n = 104) (%)	Allergists/immunologists (n = 58) (%)	Primary care providers (n = 88) (%)	All respondents (n = 250) (%)
No wait time required	0	0	0	0
5 to 10 minutes	14.4	5.2	5.7	9.2
11 to 20 minutes	58.7	32.8	35.2	44.4
21 to 30 minutes	25.0	44.8	38.6	34.4
>30 minutes	1.9	17.2	20.5	12.0

*All values are the percentage of respondents.

is suspected of causing symptoms because there is a potential for clinically irrelevant positive test results. Our study sought to determine if physicians were performing food allergy testing in their rhinitis patients, and how commonly food testing was being performed. Published guidelines on rhinitis are silent on the question of whether there is any role for testing food allergens in rhinitis patients.^{9,12} Our survey found that a large number of respondents tested rhinitis patients for food allergy “some of the time” or “most of the time,” and that A/Is were more likely to test for food allergy “most of the time.”

Home immunotherapy, wait times after injection, prescription of epinephrine autoinjectors

Historically, self-administered AIT injections at home were commonly used to make AIT a convenient, feasible treatment option for patients. However, over the last few decades, this practice has come under increased scrutiny because of the potential risk of AIT-induced fatal systemic reactions. This increase in concern roughly parallels the development of high-potency standardized allergen extracts and clinical trial data that has supported the use of stronger doses of allergen to obtain clinical benefit.

In 1993 the AAAI Board of Directors issued a position statement that AIT should only be given in a medical setting where personnel and equipment are available to treat systemic reactions.¹³ This position statement created a backlash from practitioners who felt that home AIT injections were safe in appropriately selected patients, and that prohibiting home AIT would deprive many patients of this important treatment option.^{5,6} A subsequent publication reported the results of a retrospective study on the safety of home-based AIT that did not demonstrate any fatalities. Out of an estimated 1,144,000 injections, 60% of which were administered at home, there were 31 “major” reactions, and only 1 of these occurred at home.⁷ In Filley et al.,¹⁴ a group of A/I physicians published an abstract of their retrospective review of office-based and home-based immunotherapy records over a 7-year period. There was 1 fatality in 3,554,603 IT doses, and this fatality occurred in a PCP office while the patient was at maintenance dosing. In this review, high-dose AIT was used, and there were zero fatalities in 2,006,335 doses administered at home.¹⁴

The admonitions against home AIT have been repeated in additional practice parameters, despite a lack of data to demonstrate or quantify the risk of home-based immunotherapy.⁴

We sought to determine the prevalence of this practice, with attention to any differences that may exist among specialties. The only recent published data on use of home AIT comes from a 2006 Survey of AAAAI members, in which 16% of respondents reported that they allowed some home immunotherapy, though usually only in selected circumstances.¹⁵ Our survey study showed that a significant minority of physicians still use home AIT but there was no statistically significant difference among specialties. Our survey revealed that in some practices a large percentage of patients are still treated with home AIT.

Because of the risk of systemic reactions after an AIT injection, published guidelines recommend an observation period (30 minutes) in the physician’s office so that these reactions can be promptly recognized and treated.¹⁶ We sought to determine how often this recommendation is followed. Our survey showed that the median observation time for ENTs is 11 to 20 minutes and for A/Is and PCPs is 21 to 30 minutes. Overall, only 34% of patients are kept for 21 to 30 minutes, and 12% are kept for >30 minutes.

An additional safety concern after an AIT injection is the risk of a delayed systemic reaction that might occur more than 30 minutes after the injection. Although these are rare, it is estimated that delayed-onset systemic reactions might account for up to 50% of all systemic reactions.¹⁶ One way that physicians can manage this risk is to provide patients with epinephrine autoinjectors as well as education in their proper use.¹⁶ We sought to determine how often physicians provide epinephrine autoinjectors for use in the period after an injection. We found that 86% of ENTs and 76% of PCPs provided these for their patients compared to 43% of A/Is, and these differences were statistically significant.

SLIT and implications of outsourced vial mixing

Our study found that sublingual administration of AIT is commonly used irrespective of physician specialty. While the glycerinated allergen extracts currently used for SLIT are not FDA-approved for this purpose, the efficacy of SLIT has been confirmed via multiple randomized

placebo-controlled trials.^{1,2} The optimal dose of SLIT using glycerinated extracts available in the United States is unknown. Our survey revealed that many physicians, especially PCPs, rely on commercial entities to mix SLIT treatment vials. We found that ENT and AI physicians were more likely to outsource the production of SLIT vials compared to SCIT. There are clearly physicians who are quite willing to mix subcutaneous injection vials, but are reluctant to mix sublingual vials, despite SLIT having a better safety record. This suggests that there is a lack of understanding on how to dose SLIT, resulting in a higher rate of outsourcing as an alternative.

Limitations of this study

Like all survey studies, there are limitations to our data that must be considered when interpreting the results. This study used a commercial database of U.S. physicians to randomly select ENTs, PCPs, and A/Is for participation in the study. While this database is comprehensive, it does not include every U.S. physician in these specialties, creating the potential for bias. As with all survey studies, there was a large nonresponse rate and many of the individual physicians who started the survey did not complete it (approximately 50% attrition.) Only complete surveys were

used for this analysis. It is impossible to determine if the data derived from responders differs from the responses that would have been obtained from the nonresponders, and this is an additional possible source of bias. Nevertheless, the strength of this study is that the results are derived from a random pool of a large number of U.S. physicians, and the source of the study (AAOA task force) was not revealed to the respondents. The anonymous nature of this survey also increases the likelihood that the survey results represent more “honest” responses than would be obtained if identifiers had been included.

Conclusion

This survey of multiple specialties reveals that there are many similarities and differences among the specialties regarding allergy testing and immunotherapy beliefs and practices. A variety of allergy testing and treatment methods are employed by U.S. physicians, with some differences noted based upon specialty. Home immunotherapy is a controversial practice in the medical community, but continues to be used in allergy practices by all the specialties surveyed. Despite the lack of a specific FDA-approved product for SLIT, it is a common form of delivery, especially in primary care practices. 

References

- Bernstein IL, Li JT, Bernstein DI, Hurwitz B, Sheikh A, Durham S. Allergy diagnostic testing: an updated practice parameter. *Ann Allergy Asthma Immunol.* 2008;100:S1-S148.
- Lin SY, Erekosima N, Kim JM, et al. Sublingual immunotherapy for the treatment of allergic rhinoconjunctivitis and asthma: a systematic review. *JAMA.* 2013;309:1278–1288.
- Radulovic S, Calderon MA, Wilson D, Durham S. Sublingual immunotherapy for allergic rhinitis. *Cochrane Database Syst Rev.* 2010;(12):CD002893.
- Calderon MA, Alves B, Jacobson M, et al. Allergen injection immunotherapy for seasonal allergic rhinitis. *Cochrane Database Syst Rev.* 2007;(1):CD001936.
- Joint Task Force on Practice Parameters. Allergen immunotherapy: a practice parameter. American Academy of Allergy, Asthma and Immunology. American College of Allergy, Asthma and Immunology. *Ann Allergy Asthma Immunol.* 2003;90(1 Suppl 1):1–40.
- Wells JH. Home allergenic extract administration [Letter to editor]. *J Allergy Clin Immunol.* 1995;95:1061–1062.
- Falliers CJ. At-home administration of allergenic extracts [Letter to editor]. *J Allergy Clin Immunol.* 1995;95:1061.
- Hurst DS, Gordon BR, Fornadley JA, Hunsaker DH. Safety of home-based and office allergy immunotherapy: a multicenter prospective study. *Otolaryngol Head Neck Surg.* 1999;121:553–561.
- Tucker MH, Tankersley MS. ACAAI Immunotherapy and Diagnostics Committee. Perception and practice of sublingual immunotherapy among practicing allergists. *Ann Allergy Asthma Immunol.* 2008;101:419–425.
- Cox L, Williams B, Sicherer S, et al. American College of Allergy, Asthma and Immunology Test Task Force; American Academy of Allergy, Asthma and Immunology Specific IgE Test Task Force. Pearls and pitfalls of allergy diagnostic testing: report from the American College of Allergy, Asthma and Immunology/American Academy of Allergy, Asthma and Immunology Specific IgE Test Task Force. *Ann Allergy Asthma Immunol.* 2008;101:580–592.
- NIAID-Sponsored Expert Panel; Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the united states: report of the NIAID-sponsored expert panel. *J Allergy Clin Immunol.* 2010;126(6 Suppl):S1-S58.
- Wallace DV, Dykewicz MS, Bernstein DI, et al. Joint Task Force on Practice; American Academy of Allergy; Asthma & Immunology; American College of Allergy; Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. The diagnosis and management of rhinitis: an updated practice parameter. *J Allergy Clin Immunol.* 2008;122(2 Suppl):S1-S84.
- No authors listed. Guidelines to minimize the risk from systemic reactions caused by immunotherapy with allergenic extracts. AAAI Board of Directors. American Academy of Allergy and Immunology. *J Allergy Clin Immunol.* 1994;93:811–812.
- Filley WV, Aston CE, Coifman RE, et al. Safety of home immunotherapy. *J Allergy Clin Immunol.* 2006;117(2 Suppl):S159.
- Coifman RE, Cox LS. 2006 American Academy of Allergy, asthma and immunology member immunotherapy practice patterns and concerns. *J Allergy Clin Immunol.* 2007;119:1012–1013.
- Cox L, Nelson H, MD, Lockey R, et al. Allergen immunotherapy: a practice parameter third update. *J Allergy Clin Immunol.* 2011;127(1 Suppl):S1-S55.